Modern Money Mechanics

A Workbook on Bank Reserves and Deposit Expansion

Federal Reserve Bank of Chicago

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The purpose of this booklet is to describe the basic process of money creation in a "fractional reserve" banking system. The approach taken illustrates the changes in bank balance sheets that occur when deposits in banks change as a result of monetary action by the Federal Reserve System — the central bank of the United States. The relationships shown are based on simplifying assumptions. For the sake of simplicity, the relationships are shown as if they were mechanical, but they are not, as is described later in the booklet. Thus, they should not be interpreted to imply a close and predictable relationship between a specific central bank transaction and the quantity of money.

The introductory pages contain a brief general description of the characteristics of money and how the U.S. money system works. The illustrations in the following two sections describe two processes: first, how bank deposits expand or contract in response to changes in the amount of reserves supplied by the central bank; and second, how those reserves are affected by both Federal Reserve actions and other factors. A final section deals with some of the elements that modify, at least in the short run, the simple mechanical relationship between bank reserves and deposit money.

Money is such a routine part of everyday living that its existence and acceptance ordinarily are taken for granted. A user may sense that money must come into being either automatically as a result of economic activity or as an outgrowth of some government operation. But just *how* this happens all too often remains a mystery.

What Is Money?

If money is viewed simply as a tool used to facilitate transactions, only those media that are readily accepted in exchange for goods, services, and other assets need to be considered. Many things — from stones to baseball cards — have served this monetary function through the ages. Today, in the United States, money used in transactions is mainly of three kinds — currency (paper money and coins in the pockets and purses of the public); demand deposits (non-interest-bearing checking accounts in banks); and other checkable deposits, such as negotiable order of withdrawal (NOW) accounts, at all depository institutions, including commercial and savings banks, savings and loan associations, and credit unions. Travelers checks also are included in the definition of transactions money. Since $1 in currency and $1 in checkable deposits are freely convertible into each other and both can be used directly for expenditures, they are money in equal degree. However, only the cash and balances held by the nonbank public are counted in the money supply. Deposits of the U.S. Treasury, depository institutions, foreign banks and official institutions, as well as vault cash in depository institutions are excluded.

This transactions concept of money is the one designated as M1 in the Federal Reserve's money stock statistics. Broader concepts of money (M2 and M3) include M1 as well as certain other financial assets (such as savings and time deposits at depository institutions and shares in money market mutual funds) which are relatively liquid but believed to represent principally investments to their holders rather than media of exchange. While funds can be shifted fairly easily between transaction balances and these other liquid assets, the money-creation process takes place principally through transaction accounts. In the remainder of this booklet, "money" means M1.

The distribution between the currency and deposit components of money depends largely on the preferences of the public. When a depositor cashes a check or makes a cash withdrawal through an automatic teller machine, he or she reduces the amount of deposits and increases the amount of currency held by the public. Conversely, when people have more currency than is needed, some is returned to banks in exchange for deposits.

While currency is used for a great variety of small transactions, most of the dollar amount of money payments in our economy are made by check or by electronic

transfer between deposit accounts. Moreover, currency is a relatively small part of the money stock. About 69 percent, or $623 billion, of the $898 billion total money stock in December 1991, was in the form of transaction deposits, of which $290 billion were demand and $333 billion were other checkable deposits.

What Makes Money Valuable?

In the United States neither paper currency nor deposits have value as commodities. Intrinsically, a dollar bill is just a piece of paper, deposits merely book entries. Coins do have some intrinsic value as metal, but generally far less than their face value.

What, then, makes these instruments — checks, paper money, and coins — acceptable at face value in payment of all debts and for other monetary uses? Mainly, it is the confidence people have that they will be able to exchange such money for other financial assets and for real goods and services whenever they choose to do so.

Money, like anything else, derives its value from its *scarcity* in relation to its usefulness. Commodities or services are more or less valuable because there are more or less of them relative to the amounts people want. Money's usefulness is its unique ability to command other goods and services and to permit a holder to be constantly ready to do so. How much money is demanded depends on several factors, such as the total volume of transactions in the economy at any given time, the payments habits of the society, the amount of money that individuals and businesses want to keep on hand to take care of unexpected transactions, and the foregone earnings of holding financial assets in the form of money rather than some other asset.

Control of the *quantity* of money is essential if its value is to be kept stable. Money's real value can be measured only in terms of what it will buy. Therefore, its value varies inversely with the general level of prices. Assuming a constant rate of use, if the volume of money grows more rapidly than the rate at which the output of real goods and services increases, prices will rise. This will happen because there will be more money than there will be goods and services to spend it on at prevailing prices. But if, on the other hand, growth in the supply of money does not keep pace with the economy's current production, then prices will fall, the nation's labor force, factories, and other production facilities will not be fully employed, or both.

Just how large the stock of money needs to be in order to handle the transactions of the economy without exerting undue influence on the price level depends on how intensively money is being used. Every transaction deposit balance and every dollar bill is a part of somebody's spendable funds at any given time, ready to move to other owners as transactions take place. Some holders spend money quickly after they get it, making these funds available for other uses. Others, however, hold money for longer periods. Obviously, when some money remains idle, a larger total is needed to accomplish any given volume of transactions.

Who Creates Money?

Changes in the quantity of money may originate with actions of the Federal Reserve System (the central bank), depository institutions (principally commercial banks), or the public. The major control, however, rests with the central bank.

The actual process of money creation takes place primarily in banks.[1] As noted earlier, checkable liabilities of banks are money. These liabilities are customers' accounts. They increase when customers deposit currency and checks and when the proceeds of loans made by the banks are credited to borrowers' accounts.

In the absence of legal reserve requirements, banks can build up deposits by increasing loans and investments so long as they keep enough currency on hand to redeem whatever amounts the holders of deposits want to convert into currency. This unique attribute of the banking business was discovered many centuries ago.

It started with goldsmiths. As early bankers, they initially provided safekeeping services, making a profit from vault storage fees for gold and coins deposited with them. People would redeem their "deposit receipts" whenever they needed gold or coins to purchase something, and physically take the gold or coins to the seller who, in turn, would deposit them for safekeeping, often with the same banker. Everyone soon found that it was a lot easier simply to use the deposit receipts directly as a means of payment. These receipts, which became known as notes, were acceptable as money since whoever held them could go to the banker and exchange them for metallic money.

Then, bankers discovered that they could make loans merely by giving their promises to pay, or bank notes, to borrowers. In this way, banks began to create money. More notes could be issued than the gold and coin on hand because only a portion of the notes outstanding would be presented for payment at any one time. Enough metallic money had to be kept on hand, of course, to redeem whatever volume of notes was presented for payment.

Transaction deposits are the modern counterpart of bank notes. It was a small step from printing notes to making book entries crediting deposits of borrowers, which the borrowers in turn could "spend" by writing checks, thereby "printing" their own money.

[1] In order to describe the money-creation process as simply as possible, the term "bank" used in this booklet should be understood to encompass all depository institutions. Since the Depository Institutions Deregulation and Monetary Control Act of 1980, all depository institutions have been permitted to offer interest-bearing transaction accounts to certain customers. Transaction accounts (interest-bearing as well as demand deposits on which payment of interest is still legally prohibited) at all depository institutions are subject to the reserve requirements set by the Federal Reserve. Thus all such institutions, not just commercial banks, have the potential for creating money.

What Limits the Amount of Money Banks Can Create?

If deposit money can be created so easily, what is to prevent banks from making too much — more than sufficient to keep the nation's productive resources fully employed without price inflation? Like its predecessor, the modern bank must keep available, to make payment on demand, a considerable amount of currency and funds on deposit with the central bank. The bank must be prepared to convert deposit money into currency for those depositors who request currency. It must make remittance on checks written by depositors and presented for payment by other banks (settle adverse clearings). Finally, it must maintain legally required reserves, in the form of vault cash and/or balances at its Federal Reserve Bank, equal to a prescribed percentage of its deposits.

The public's demand for currency varies greatly, but generally follows a seasonal pattern that is quite predictable. The effects on bank funds of these variations in the amount of currency held by the public usually are offset by the central bank, which replaces the reserves absorbed by currency withdrawals from banks. (Just how this is done will be explained later.) For all banks taken together, there is no net drain of funds through clearings. A check drawn on one bank normally will be deposited to the credit of another account, if not in the same bank, then in some other bank.

These operating needs influence the minimum amount of reserves an individual bank will hold voluntarily. However, as long as this minimum amount is less than what is legally required, operating needs are of relatively minor importance as a restraint on aggregate deposit expansion in the banking system. Such expansion cannot continue beyond the point where the amount of reserves that all banks have is just sufficient to satisfy legal requirements under our "fractional reserve" system. For example, if reserves of 20 percent were required, deposits could expand only until they were five times as large as reserves. Reserves of $10 million could support deposits of $50 million. The lower the percentage requirement, the greater the deposit expansion that can be supported by each additional reserve dollar. Thus, the legal reserve ratio together with the dollar amount of bank reserves are the factors that set the upper limit to money creation.

What Are Bank Reserves?

Currency held in bank vaults may be counted as legal reserves as well as deposits (reserve balances) at the Federal Reserve Banks. Both are equally acceptable in satisfaction of reserve requirements. A bank can always obtain reserve balances by sending currency to its Reserve Bank and can obtain currency by drawing on its reserve balance. Because either can be used to support a much larger volume of deposit liabilities of banks, currency in circulation and reserve balances together are often referred to as "high-powered money" or the "monetary base." Reserve balances and vault cash in banks, however, are not counted as part of the money stock held by the public.

For individual banks, reserve accounts also serve as working balances.[2] Banks may increase the balances in their reserve accounts by depositing checks and proceeds from electronic funds transfers as well as currency. Or they may draw down these balances by writing checks on them or by authorizing a debit to them in payment for currency, customers' checks, or other funds transfers.

Although reserve accounts are used as working balances, each bank must maintain, on the average for the relevant reserve maintenance period, reserve balances at the Reserve Bank and vault cash which together are equal to its required reserves, as determined by the amount of its deposits in the reserve computation period.

Where Do Bank Reserves Come From?

Increases or decreases in bank reserves can result from a number of factors discussed later in this booklet. From the standpoint of money creation, however, the essential point is that the reserves of banks are, for the most part, liabilities of the Federal Reserve Banks, and net changes in them are largely determined by actions of the Federal Reserve System. Thus, the Federal Reserve, through its ability to vary both the total volume of reserves and the required ratio of reserves to deposit liabilities, influences banks' decisions with respect to their assets and deposits. One of the major responsibilities of the Federal Reserve System is to provide the total amount of reserves consistent with the monetary needs of the economy at reasonably stable prices. Such actions take into consideration, of course, any changes in the pace at which money is being used and changes in the public's demands for cash balances.

The reader should be mindful that deposits and reserves tend to expand simultaneously and that the Federal Reserve's control often is exerted through the marketplace as individual banks find it either cheaper or more expensive to obtain their required reserves, depending on the willingness of the Fed to support the current rate of credit and deposit expansion.

While an individual bank can obtain reserves by bidding them away from other banks, this cannot be done by the banking system as a whole. Except for reserves borrowed temporarily from the Federal Reserve's discount window, as is shown later, the supply of reserves in the banking system is controlled by the Federal Reserve.

Moreover, a given increase in bank reserves is not necessarily accompanied by an expansion in money equal to the theoretical potential based on the required ratio of reserves to deposits. What happens to the quantity of

[2] Part of an individual bank's reserve account may represent its reserve balance used to meet its reserve requirements while another part may be its required clearing balance on which earnings credits are generated to pay for Federal Reserve Bank services.

money will vary, depending upon the reactions of the banks and the public. A number of slippages may occur. What amount of reserves will be drained into the public's currency holdings? To what extent will the increase in total reserves remain unused as excess reserves? How much will be absorbed by deposits or other liabilities not defined as money but against which banks might also have to hold reserves? How sensitive are the banks to policy actions of the central bank? The significance of these questions will be discussed later in this booklet. The answers indicate why changes in the money supply may be different than expected or may respond to policy action only after considerable time has elapsed.

In the succeeding pages, the effects of various transactions on the quantity of money are described and illustrated. The basic working tool is the "T" account, which provides a simple means of tracing, step by step, the effects of these transactions on both the asset and liability sides of bank balance sheets. Changes in asset items are entered on the left half of the "T" and changes in liabilities on the right half. For any one transaction, of course, there must be at least two entries in order to maintain the equality of assets and liabilities.

Bank Deposits—How They Expand or Contract

Let us assume that expansion in the money stock is desired by the Federal Reserve to achieve its policy objectives. One way the central bank can initiate such an expansion is through purchases of securities in the open market. Payment for the securities adds to bank reserves. Such purchases (and sales) are called "open market operations."

How do open market purchases add to bank reserves and deposits? Suppose the Federal Reserve System, through its trading desk at the Federal Reserve Bank of New York, buys $10,000 of Treasury bills from a dealer in U.S. government securities.[3] In today's world of computerized financial transactions, the Federal Reserve Bank pays for the securities with an "electronic" check drawn on itself.[4] Via its "Fedwire" transfer network, the Federal Reserve notifies the dealer's designated bank (Bank A) that payment for the securities should be credited to (deposited in) the dealer's account at Bank A. At the same time, Bank A's reserve account at the Federal Reserve is credited for the amount of the securities purchase. The Federal Reserve System has added $10,000 of securities to its assets, which it has paid for, in effect, by ***creating*** a liability on itself in the form of bank reserve balances. These reserves on Bank A's books are matched by $10,000 of the dealer's deposits that did not exist before. *See illustration 1.*

How the Multiple Expansion Process Works

If the process ended here, there would be no "multiple" expansion, i.e., deposits and bank reserves would have changed by the same amount. However, banks are required to maintain reserves equal to only a fraction of their deposits. Reserves in excess of this amount may be used to increase earning assets — loans and investments. Unused or excess reserves earn no interest. Under current regulations, the reserve requirement against most transaction accounts is 10 percent.[5] Assuming, for simplicity, a uniform 10 percent reserve requirement against all transaction deposits, and further assuming that all banks attempt to remain fully invested, we can now trace the process of expansion in deposits which can take place on the basis of the *additional* reserves provided by the Federal Reserve System's purchase of U.S. government securities.

The expansion process may or may not begin with Bank A, depending on what the dealer does with the money received from the sale of securities. If the dealer immediately writes checks for $10,000 and all of them are deposited in other banks, Bank A loses both deposits and reserves and shows no net change as a result of the System's open market purchase. However, other banks have received them. Most likely, a part of the initial deposit will remain with Bank A, and a part will be shifted to other banks as the dealer's checks clear.

It does not really matter where this money is at any given time. The important fact is that ***these deposits do not disappear.*** They are in some deposit accounts at all times. All banks together have $10,000 of deposits and reserves that they did not have before. However, they are not required to keep $10,000 of reserves against the $10,000 of deposits. All they need to retain, under a 10 percent reserve requirement, is $1,000. The remaining $9,000 is "excess reserves." This amount can be loaned or invested. *See illustration 2.*

If business is active, the banks with excess reserves probably will have opportunities to loan the $9,000. Of course, they do not really pay out loans from the money they receive as deposits. If they did this, no additional money would be created. What they do when they make loans is to accept promissory notes in exchange for credits to the borrowers' transaction accounts. Loans (assets) and deposits (liabilities) both rise by $9,000. Reserves are unchanged by the loan transactions. But the deposit credits constitute new additions to the total deposits of the banking system. *See illustration 3.*

[3] Dollar amounts used in the various illustrations do not necessarily bear any resemblance to actual transactions. For example, open market operations typically are conducted with many dealers and in amounts totaling several billion dollars.

[4] Indeed, many transactions today are accomplished through an electronic transfer of funds between accounts rather than through issuance of a paper check. Apart from the timing of posting, the accounting entries are the same whether a transfer is made with a paper check or electronically. The term "check," therefore, is used for both types of transfers.

[5] For each bank, the reserve requirement is 3 percent on a specified base amount of transaction accounts and 10 percent on the amount above this base. Initially, the Monetary Control Act set this base amount — called the "low reserve tranche" — at $25 million, and provided for it to change annually in line with the growth in transaction deposits nationally. The low reserve tranche was $41.1 million in 1991 and $42.2 million in 1992. The Garn-St Germain Act of 1982 further modified these requirements by exempting the first $2 million of reservable liabilities from reserve requirements. Like the low reserve tranche, the exempt level is adjusted each year to reflect growth in reservable liabilities. The exempt level was $3.4 million in 1991 and $3.6 million in 1992.

Deposit Expansion

1 When the Federal Reserve Bank purchases government securities, bank reserves increase. This happens because the seller of the securities receives payment through a credit to a designated deposit account at a bank (Bank A) which the Federal Reserve effects by crediting the reserve account of Bank A.

FEDERAL RESERVE BANK

Assets		Liabilities	
U.S. government securities	+ 10,000	Reserve accounts: Bank A	+ 10,000

BANK A

Assets		Liabilities	
Reserves with F.R. Banks	+ 10,000	Customer deposit	+ 10,000

The customer deposit at Bank A likely will be transferred, in part, to other banks and quickly loses its identity amid the huge interbank flow of deposits.

2 As a result, all banks taken together now have "excess" reserves on which deposit expansion can take place.

Total reserves gained from new deposits		10,000
less: Required against new deposits (at 10 percent)		1,000
equals: Excess reserves		9,000

Expansion—Stage 1

3 Expansion takes place only if the banks that hold these excess reserves (Stage 1 banks) increase their loans or investments. Loans are made by crediting the borrower's deposit account, i.e., by creating additional deposit money.

STAGE I BANKS

Assets		Liabilities	
Loans	+ 9,000	Borrower deposits	+ 9,000

This is the beginning of the deposit expansion process. In the first stage of the process, total loans and deposits of the banks rise by an amount equal to the excess reserves existing before any loans were made (90 percent of the initial deposit increase). At the end of Stage 1, deposits have risen a total of $19,000 (the initial $10,000 provided by the Federal Reserve's action plus the $9,000 in deposits created by Stage 1 banks). *See illustration 4.* However, only $900 (10 percent of $9,000) of excess reserves have been absorbed by the additional deposit growth at Stage 1 banks. *See illustration 5.*

The lending banks, however, do not expect to retain the deposits they create through their loan operations. Borrowers write checks that probably will be deposited in other banks. As these checks move through the collection process, the Federal Reserve Banks debit the reserve accounts of the paying banks (Stage 1 banks) and credit those of the receiving banks. *See illustration 6.*

Whether Stage 1 banks actually do lose the deposits to *other* banks or whether any or all of the borrowers' checks are redeposited in these *same* banks makes no difference in the expansion process. If the lending banks *expect* to lose these deposits — and an equal amount of reserves — as the borrowers' checks are paid, they will not lend more than their excess reserves. Like the original $10,000 deposit, the loan-created deposits may be transferred to other banks, but they remain somewhere in the banking system. Whichever banks receive them also acquire equal amounts of reserves, of which all but 10 percent will be "excess."

Assuming that the banks holding the $9,000 of deposits created in Stage 1 in turn make loans equal to their excess reserves, then loans and deposits will rise by a further $8,100 in the second stage of expansion. This process can continue until deposits have risen to the point where all the reserves provided by the initial purchase of government securities by the Federal Reserve System are just sufficient to satisfy reserve requirements against the newly created deposits. *(See pages 10 and 11.)*

The individual bank, of course, is not concerned as to the stages of expansion in which it may be participating. Inflows and outflows of deposits occur continuously. Any deposit received is new money, regardless of its ultimate source. But if bank policy is to make loans and investments equal to whatever reserves are in excess of legal requirements, the expansion process will be carried on.

How Much Can Deposits Expand in the Banking System?

The total amount of expansion that can take place is illustrated on page 11. Carried through to theoretical limits, the initial $10,000 of reserves distributed within the banking system gives rise to an expansion of $90,000 in bank credit (loans and investments) and supports a total of $100,000 in new deposits under a 10 percent reserve requirement. The deposit expansion factor for a given amount of new reserves is thus the reciprocal of the required reserve percentage (1/.10 = 10). Loan expansion will be less by the amount of the initial injection. The multiple expansion is possible because the banks as a group are like one large bank in which checks drawn against borrowers' deposits result in credits to accounts of other depositors, with no net change in total reserves.

Expansion through Bank Investments

Deposit expansion can proceed from investments as well as loans. Suppose that the demand for loans at some Stage 1 banks is slack. These banks would then probably purchase securities. If the sellers of the securities were customers, the banks would make payment by crediting the customers' transaction accounts; deposit liabilities would rise just as if loans had been made. More likely, these banks would purchase the securities through dealers, paying for them with checks on themselves or on their reserve accounts. These checks would be deposited in the sellers' banks. In either case, the net effects on the banking system are identical with those resulting from loan operations.

4 As a result of the process so far, total assets and total liabilities of all banks together have risen 19,000.

ALL BANKS

Assets		Liabilities	
Reserves with F.R. Banks	+ 10,000	Deposits: Initial	+ 10,000
Loans	+ 9,000	Stage 1	+ 9,000
Total	+ 19,000	Total	+ 19,000

5 Excess reserves have been reduced by the amount required against the deposits created by the loans made in Stage 1.

Total reserves gained from initial deposits		10,000
less: Required against initial deposits	1,000	
less: Required against Stage 1 deposits	900	1,900
equals: Excess reserves		8,100

Why do these banks stop increasing their loans and deposits when they still have excess reserves?

6 . . . because borrowers write checks on their accounts at the lending banks. As these checks are deposited in the payees' banks and cleared, the deposits created by Stage 1 loans and an equal amount of reserves may be transferred to other banks.

STAGE 1 BANKS

Assets		Liabilities	
Reserves with F.R. Banks	- 9,000	Borrower deposits	- 9,000

FEDERAL RESERVE BANK

Assets	Liabilities	
	Reserve accounts:	
	Stage 1 banks	- 9,000
	Other banks	+ 9,000

OTHER BANKS

Assets		Liabilities	
Reserves with F.R. Banks	+ 9,000	Deposits	+ 9,000

Deposit expansion has just begun!

7 Expansion continues as the banks that have excess reserves increase their loans by that amount, crediting borrowers' deposit accounts in the process, thus creating still more money.

STAGE 2 BANKS

Assets		Liabilities	
Loans	+ 8,100	Borrower deposits	+ 8,100

8 Now the banking system's assets and liabilities have risen by 27,100.

ALL BANKS

Assets		Liabilities	
Reserves with F.R. Banks	+ 10,000	Deposits:	
Loans:		Initial	+ 10,000
Stage 1	+ 9,000	Stage 1	+ 9,000
Stage 2	+ 8,100	Stage 2	+ 8,100
Total	+ 27,100	Total	+ 27,100

9 But there are still 7,290 of excess reserves in the banking system.

Total reserves gained from initial deposits		10,000
less: Required against initial deposits	1,000	
less: Required against Stage 1 deposits	900	
less: Required against Stage 2 deposits	810	2,710
equals: Excess reserves		7,290

↓ to Stage 3 banks

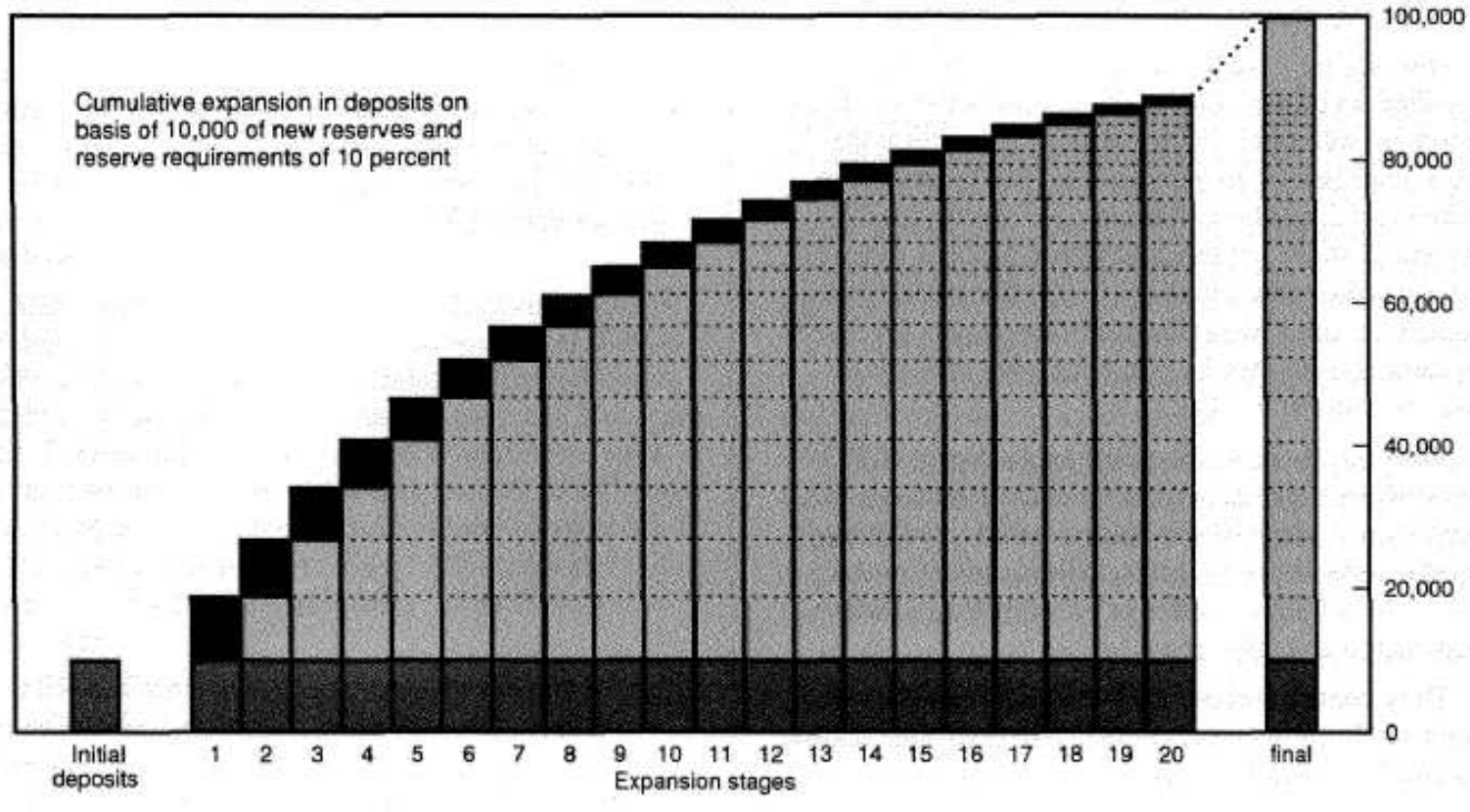
10 As borrowers make payments, these reserves will be further dispersed, and the process can continue through many more stages, in progressively smaller increments, until the entire 10,000 of reserves have been absorbed by deposit growth. As is apparent from the summary table on page 11, more than two-thirds of the deposit expansion potential is reached after the first ten stages.

It should be understood that the stages of expansion occur neither simultaneously nor in the sequence described above. Some banks use their reserves incompletely or only after a considerable time lag, while others expand assets on the basis of expected reserve growth. The process is, in fact, continuous and may never reach its theoretical limits.

Thus through stage after stage of expansion, "money" can grow to a total of 10 times the new reserves supplied to the banking system . . .

		Assets				Liabilities
		Reserves				
		Total	[Required]	[Excess]	Loans and Investments	Deposits
Initial reserves provided		10,000	1,000	9,000	--	10,000
Expansion —	Stage 1	10,000	1,900	8,100	9,000	19,000
	Stage 2	10,000	2,710	7,290	17,100	27,100
	Stage 3	10,000	3,439	6,561	24,390	34,390
	Stage 4	10,000	4,095	5,905	30,951	40,951
	Stage 5	10,000	4,686	5,314	36,856	46,856
	Stage 6	10,000	5,217	4,783	42,170	52,170
	Stage 7	10,000	5,695	4,305	46,953	56,953
	Stage 8	10,000	6,126	3,874	51,258	61,258
	Stage 9	10,000	6,513	3,487	55,132	65,132
	Stage 10	10,000	6,862	3,138	58,619	68,619
	.	.	.	.	.	.
	.	.	.	.	.	.
	.	.	.	.	.	.
	Stage 20	10,000	8,906	1,094	79,058	89,058
	.	.	.	.	.	.
	.	.	.	.	.	.
	.	.	.	.	.	.
	Final stage	10,000	10,000	0	90,000	100,000

. . . as the new deposits created by loans at each stage are added to those created at all earlier stages and those supplied by the initial reserve-creating action.


Cumulative expansion in deposits on basis of 10,000 of new reserves and reserve requirements of 10 percent
100,000
80,000
60,000
40,000
20,000
0
Initial deposits
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
final
Expansion stages

How Open Market Sales Reduce Bank Reserves and Deposits

Now suppose some reduction in the amount of money is desired. Normally this would reflect temporary or seasonal reductions in activity to be financed since, on a year-to-year basis, a growing economy needs at least some monetary expansion. Just as purchases of government securities by the Federal Reserve System can provide the basis for deposit expansion by adding to bank reserves, sales of securities by the Federal Reserve System reduce the money stock by absorbing bank reserves. The process is essentially the reverse of the expansion steps just described.

Suppose the Federal Reserve System sells $10,000 of Treasury bills to a U.S. government securities dealer and receives in payment an "electronic" check drawn on Bank A. As this payment is made, Bank A's reserve account at a Federal Reserve Bank is reduced by $10,000. As a result, the Federal Reserve System's holdings of securities and the reserve accounts of banks are both reduced $10,000. The $10,000 reduction in Bank A's deposit liabilities constitutes a decline in the money stock. *See illustration 11.*

Contraction Also Is a Cumulative Process

While Bank A may have regained part of the initial reduction in deposits from other banks as a result of interbank deposit flows, all banks taken together have $10,000 less in both deposits and reserves than they had before the Federal Reserve's sales of securities. The amount of reserves freed by the decline in deposits, however, is only $1,000 (10 percent of $10,000). Unless the banks that lose the reserves and deposits had excess reserves, they are left with a reserve deficiency of $9,000. *See illustration 12.* Although they may borrow from the Federal Reserve Banks to cover this deficiency temporarily, sooner or later the banks will have to obtain the necessary reserves in some other way or reduce their needs for reserves.

One way for a bank to obtain the reserves it needs is by selling securities. But, as the buyers of the securities pay for them with funds in their deposit accounts in the same or other banks, the net result is a $9,000 decline in securities and deposits at all banks. *See illustration 13.* At the end of Stage 1 of the contraction process, deposits have been reduced by a total of $19,000 (the initial $10,000 resulting from the Federal Reserve's action plus the $9,000 in deposits extinguished by securities sales of Stage 1 banks). *See illustration 14.*

However, there is now a reserve deficiency of $8,100 at banks whose depositors drew down their accounts to purchase the securities from Stage 1 banks. As the new group of reserve-deficient banks, in turn, makes up this deficiency by selling securities or reducing loans, further deposit contraction takes place.

Thus, contraction proceeds through reductions in deposits and loans or investments in one stage after another until total deposits have been reduced to the point where the smaller volume of reserves is adequate to support them. The contraction multiple is the same as that which applies in the case of expansion. Under a 10 percent reserve requirement, a $10,000 reduction in reserves would ultimately entail reductions of $100,000 in deposits and $90,000 in loans and investments.

As in the case of deposit expansion, contraction of bank deposits may take place as a result of either sales of securities or reductions of loans. While some adjustments of both kinds undoubtedly would be made, the initial impact probably would be reflected in sales of government securities. Most types of outstanding loans cannot be called for payment prior to their due dates. But the bank may cease to make new loans or refuse to renew outstanding ones to replace those currently maturing. Thus, deposits built up by borrowers for the purpose of loan retirement would be extinguished as loans were repaid.

There is one important difference between the expansion and contraction processes. When the Federal Reserve System adds to bank reserves, expansion of credit and deposits ***may*** take place up to the limits permitted by the minimum reserve ratio that banks are required to maintain. But when the System acts to reduce the amount of bank reserves, contraction of credit and deposits ***must*** take place (except to the extent that existing excess reserve balances and/or surplus vault cash are utilized) to the point where the required ratio of reserves to deposits is restored. But the significance of this difference should not be overemphasized. Because excess reserve balances do not earn interest, there is a strong incentive to convert them into earning assets (loans and investments).

Deposit Contraction

11 When the Federal Reserve Bank sells government securities, bank reserves decline. This happens because the buyer of the securities makes payment through a debit to a designated deposit account at a bank (Bank A), with the transfer of funds being effected by a debit to Bank A's reserve account at the Federal Reserve Bank.

FEDERAL RESERVE BANK

Assets		Liabilities	
U.S. government securities	- 10,000	Reserve accounts: Bank A	- 10,000

BANK A

Assets		Liabilities	
Reserves with F.R. Banks	- 10,000	Customer deposit	- 10,000

This reduction in the customer deposit at Bank A may be spread among a number of banks through interbank deposit flows.

12 The loss of reserves means that all banks taken together now have a reserve deficiency.

Total reserves lost from deposit withdrawal	10,000
less: Reserves freed by deposit decline (at 10 percent)	1,000
equals: Deficiency in reserves against remaining deposits.	9,000

Contraction—Stage 1

13 The banks with the reserve deficiencies (Stage 1 banks) can sell government securities to acquire reserves, but this causes a decline in the deposits and reserves of the buyers' banks.

STAGE I BANKS

Assets		Liabilities	
U.S. government securities	- 9,000		
Reserves with F.R. Banks	+ 9,000		

FEDERAL RESERVE BANK

Assets		Liabilities	
		Reserve accounts:	
		Stage I banks	+ 9,000
		Other banks	- 9,000

OTHER BANKS

Assets		Liabilities	
Reserves with F.R. Banks	- 9,000	Deposits	- 9,000

14 As a result of the process so far, assets and total deposits of all banks together have declined 19,000. Stage 1 contraction has freed 900 of reserves, but there is still a reserve deficiency of 8,100.

ALL BANKS

Assets		Liabilities	
Reserves with F.R. Banks	- 10,000	Deposits: Initial	- 10,000
		Stage I	- 9,000
U.S. government securities	- 9,000		
Total	- 19,000	Total	- 19,000

Further contraction must take place!

Bank Reserves—How They Change

Money has been defined as the sum of transaction accounts in depository institutions, and currency and travelers checks in the hands of the public. Currency is something almost everyone uses every day. Therefore, when most people think of money, they think of currency. Contrary to this popular impression, however, *transaction deposits* are the most significant part of the money stock. People keep enough currency on hand to effect small face-to-face transactions, but they write checks to cover most large expenditures. Most businesses probably hold even smaller amounts of currency in relation to their total transactions than do individuals.

Since the most important component of money is transaction deposits, and since these deposits must be supported by reserves, the central bank's influence over money hinges on its control over the total amount of reserves and the conditions under which banks can obtain them.

The preceding illustrations of the expansion and contraction processes have demonstrated how the central bank, by purchasing and selling government securities, can deliberately change aggregate bank reserves in order to affect deposits. But open market operations are only one of a number of kinds of transactions or developments that cause changes in reserves. Some changes originate from actions taken by the public, by the Treasury Department, by the banks, or by foreign and international institutions. Other changes arise from the service functions and operating needs of the Reserve Banks themselves.

The various factors that provide and absorb bank reserve balances, together with symbols indicating the effects of these developments, are listed on the opposite page. This tabulation also indicates the nature of the balancing entries on the Federal Reserve's books. (To the extent that the impact is absorbed by changes in banks' vault cash, the Federal Reserve's books are unaffected.)

Independent Factors Versus Policy Action

It is apparent that bank reserves are affected in several ways that are independent of the control of the central bank. Most of these "independent" elements are changing more or less continually. Sometimes their effects may last only a day or two before being reversed automatically. This happens, for instance, when bad weather slows up the check collection process, giving rise to an automatic increase in Federal Reserve credit in the form of "float." Other influences, such as changes in the public's currency holdings, may persist for longer periods of time.

Still other variations in bank reserves result solely from the mechanics of institutional arrangements among the Treasury, the Federal Reserve Banks, and the depository institutions. The Treasury, for example, keeps part of its operating cash balance on deposit with banks. But virtually all disbursements are made from its balance in the Reserve Banks. As is shown later, any buildup in balances at the Reserve Banks prior to expenditure by the Treasury causes a dollar-for-dollar drain on bank reserves.

In contrast to these independent elements that affect reserves are the policy actions taken by the Federal Reserve System. The way System open market purchases and sales of securities affect reserves has already been described. In addition, there are two other ways in which the System can affect bank reserves and potential deposit volume directly: first, through loans to depository institutions; and second, through changes in reserve requirement percentages. A change in the required reserve ratio, of course, does not alter the dollar volume of reserves directly but does change the amount of deposits that a given amount of reserves can support.

Any change in reserves, regardless of its origin, has the same potential to affect deposits. Therefore, in order to achieve the net reserve effects consistent with its monetary policy objectives, the Federal Reserve System continuously must take account of what the independent factors are doing to reserves and then, using its policy tools, offset or supplement them as the situation may require.

By far the largest number and amount of the System's gross open market transactions are undertaken to offset drains from or additions to bank reserves from non-Federal Reserve sources that might otherwise cause abrupt changes in credit availability. In addition, Federal Reserve purchases and/or sales of securities are made to provide the reserves needed to support the rate of money growth consistent with monetary policy objectives.

In this section of the booklet, several kinds of transactions that can have important week-to-week effects on bank reserves are traced in detail. Other factors that normally have only a small influence are described briefly on page 35.

Factors Changing Reserve Balances—Independent and Policy Actions

	FEDERAL RESERVE BANKS		
	Assets	Liabilities	
		Reserve balances	Other
Public actions			
Increase in currency holdings		-	+
Decrease in currency holdings		+	-
Treasury, bank, and foreign actions			
Increase in Treasury deposits in F.R. Banks		-	+
Decrease in Treasury deposits in F.R. Banks		+	-
Gold purchases (inflow) or increase in official valuation*		+	-
Gold sales (outflow)*		-	+
Increase in SDR certificates issued*		+	-
Decrease in SDR certificates issued*		-	+
Increase in Treasury currency outstanding*		+	-
Decrease in Treasury currency outstanding*		-	+
Increase in Treasury cash holdings*		-	+
Decrease in Treasury cash holdings*		+	-
Increase in service-related balances/adjustments		-	+
Decrease in service-related balances/adjustments		+	-
Increase in foreign and other deposits in F.R. Banks		-	+
Decrease in foreign and other deposits in F.R. Banks		+	-
Federal Reserve actions			
Purchases of securities	+	+	
Sales of securities	-	-	
Loans to depository institutions	+	+	
Repayment of loans to depository institutions	-	-	
Increase in Federal Reserve float	+	+	
Decrease in Federal Reserve float	-	-	
Increase in assets denominated in foreign currencies	+	+	
Decrease in assets denominated in foreign currencies	-	-	
Increase in other assets**	+	+	
Decrease in other assets**	-	-	
Increase in other liabilities**		-	+
Decrease in other liabilities**		+	-
Increase in capital accounts**		-	+
Decrease in capital accounts**		+	-
Increase in reserve requirements		-***	
Decrease in reserve requirements		+***	

* These factors represent assets and liabilities of the Treasury. Changes in them typically affect reserve balances through a related change in the Federal Reserve Banks' liability "Treasury deposits."

** Included in "Other Federal Reserve accounts" as described on page 35.

*** Effect on excess reserves. Total reserves are unchanged.

Note: To the extent that reserve changes are in the form of vault cash, Federal Reserve accounts are not affected.

Changes in the Amount of Currency Held by the Public

Changes in the amount of currency held by the public typically follow a fairly regular intramonthly pattern. Major changes also occur over holiday periods and during the Christmas shopping season — times when people find it convenient to keep more pocket money on hand. *(See chart.)* The public acquires currency from banks by cashing checks.[6] When deposits, which are fractional reserve money, are exchanged for currency, which is 100 percent reserve money, the banking system experiences a net reserve drain. Under the assumed 10 percent reserve requirement, a given amount of bank reserves can support deposits ten times as great, but when drawn upon to meet currency demand, the exchange is one to one. A $1 increase in currency uses up $1 of reserves.

Suppose a bank customer cashed a $100 check to obtain currency needed for a weekend holiday. Bank deposits decline $100 because the customer pays for the currency with a check on his or her transaction deposit; and the bank's currency (vault cash reserves) is also reduced $100. *See illustration 15.*

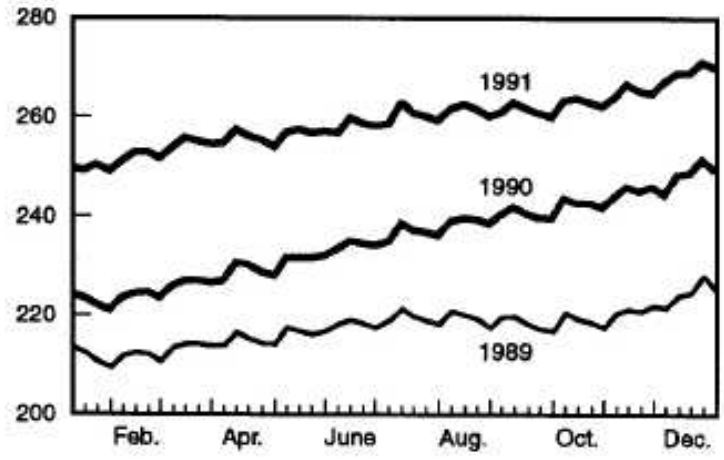
Now the bank has less currency. It may replenish its vault cash by ordering currency from its Federal Reserve Bank — making payment by authorizing a charge to its reserve account. On the Reserve Bank's books, the charge against the bank's reserve account is offset by an increase in the liability item "Federal Reserve notes." *See illustration 16.* The Reserve Bank shipment to the bank might consist, at least in part, of U.S. coins rather than Federal Reserve notes. All coins, as well as a small amount of paper currency still outstanding but no longer issued, are obligations of the Treasury. To the extent that shipments of cash to banks are in the form of coin, the offsetting entry on the Reserve Bank's books is a decline in its asset item "coin."

The public now has the same volume of money as before, except that more is in the form of currency and less is in the form of transaction deposits. Under a 10 percent reserve requirement, the amount of reserves required against the $100 of deposits was only $10, while a full $100 of reserves have been drained away by the disbursement of $100 in currency. Thus, if the bank had no excess reserves, the $100 withdrawal in currency causes a reserve deficiency of $90. Unless new reserves are provided from some other source, bank assets and deposits will have to be reduced (according to the contraction process described on pages 12 and 13) by an additional $900. At that point, the reserve deficiency caused by the cash withdrawal would be eliminated.

When Currency Returns to Banks, Reserves Rise

After holiday periods, currency returns to the banks. The customer who cashed a check to cover anticipated cash expenditures may later redeposit any currency still held that's beyond normal pocket money needs. Most of it

Currency held by the public
weekly averages, billions of dollars, not seasonally adjusted



probably will have changed hands, and it will be deposited by operators of motels, gasoline stations, restaurants, and retail stores. This process is exactly the reverse of the currency drain, except that the banks to which currency is returned may not be the same banks that paid it out. But in the aggregate, the banks gain reserves as 100 percent reserve money is converted back into fractional reserve money.

When $100 of currency is returned to the banks, deposits and vault cash are increased. *See illustration 17.* The banks can keep the currency as vault cash, which also counts as reserves. More likely, the currency will be shipped to the Reserve Banks. The Reserve Banks credit bank reserve accounts and reduce Federal Reserve note liabilities. *See illustration 18.* Since only $10 must be held against the new $100 in deposits, $90 is excess reserves and can give rise to $900 of additional deposits.[7]

To avoid multiple contraction or expansion of deposit money merely because the public wishes to change the composition of its money holdings, the effects of changes in the public's currency holdings on bank reserves normally are offset by System open market operations.

[6]The same balance sheet entries apply whether the individual physically cashes a paper check or obtains currency by withdrawing cash through an automatic teller machine.

[7]Under current reserve accounting regulations, vault cash reserves are used to satisfy reserve requirements in a future maintenance period while reserve balances satisfy requirements in the current period. As a result, the impact on a bank's current reserve position may differ from that shown unless the bank restores its vault cash position in the current period via changes in its reserve balance.

15 When a depositor cashes a check, both deposits and vault cash reserves decline.

BANK A

Assets			Liabilities	
Vault cash reserves		-100	Deposits	-100
Required	*-10*			
Deficit	*90*			

16 If the bank replenishes its vault cash, its account at the Reserve Bank is drawn down in exchange for notes issued by the Federal Reserve.

FEDERAL RESERVE BANK

Assets	Liabilities	
	Reserve accounts: Bank A	-100
	F.R. notes	+100

BANK A

Assets		Liabilities
Vault cash	+100	
Reserves with F.R. Banks	-100	

17 When currency comes back to the banks, both deposits and vault cash reserves rise.

BANK A

Assets			Liabilities	
Vault cash reserves		+100	Deposits	+100
Required	*+10*			
Excess	*+90*			

18 If the currency is returned to the Federal Reserve, reserve accounts are credited and Federal Reserve notes are taken out of circulation.

FEDERAL RESERVE BANK

Assets	Liabilities	
	Reserve accounts: Bank A	+100
	F.R. notes	-100

BANK A

Assets		Liabilities
Vault cash	-100	
Reserves with F.R. Banks	+100	

Changes in U.S. Treasury Deposits in Federal Reserve Banks

Reserve accounts of depository institutions constitute the bulk of the deposit liabilities of the Federal Reserve System. Other institutions, however, also maintain balances in the Federal Reserve Banks — mainly the U.S. Treasury, foreign central banks, and international financial institutions. In general, when these balances rise, bank reserves fall, and vice versa. This occurs because the funds used by these agencies to build up their deposits in the Reserve Banks ultimately come from deposits in banks. Conversely, recipients of payments from these agencies normally deposit the funds in banks. Through the collection process these banks receive credit to their reserve accounts.

The most important nonbank depositor is the U.S. Treasury. Part of the Treasury's operating cash balance is kept in the Federal Reserve Banks; the rest is held in depository institutions all over the country, in so-called "Treasury tax and loan" (TT&L) note accounts. *(See chart.)* Disbursements by the Treasury, however, are made against its balances at the Federal Reserve. Thus, transfers from banks to Federal Reserve Banks are made through regularly scheduled "calls" on TT&L balances to assure that sufficient funds are available to cover Treasury checks as they are presented for payment.[8]

Bank Reserves Decline as the Treasury's Deposits at the Reserve Banks Increase

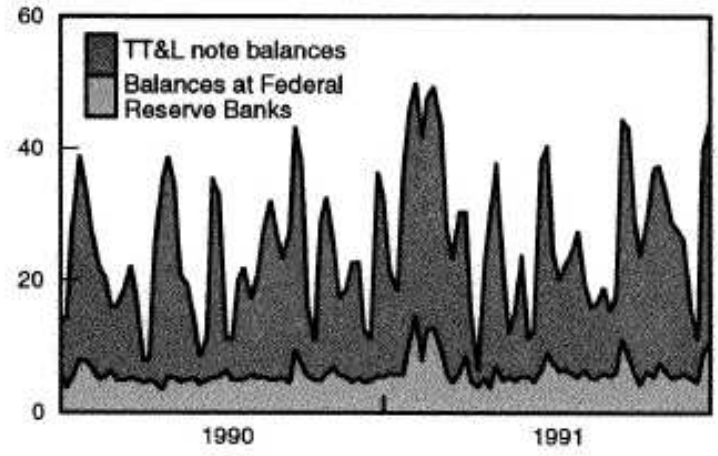
Calls on TT&L note accounts drain reserves from the banks by the full amount of the transfer as funds move from the TT&L balances (via charges to bank reserve accounts) to Treasury balances at the Reserve Banks. Because reserves are not required against TT&L note accounts, these transfers do not reduce required reserves.[9]

Suppose a Treasury call payable by Bank A amounts to $1,000. The Federal Reserve Banks are authorized to transfer the amount of the Treasury call from Bank A's reserve account at the Federal Reserve to the account of the U.S. Treasury at the Federal Reserve. As a result of the transfer, both reserves and TT&L note balances of the bank are reduced. On the books of the Reserve Bank, bank reserves decline and Treasury deposits rise. *See illustration 19.* This withdrawal of Treasury funds will cause a reserve deficiency of $1,000 since no reserves are released by the decline in TT&L note accounts at depository institutions.

Bank Reserves Rise as the Treasury's Deposits at the Reserve Banks Decline

As the Treasury makes expenditures, checks drawn on its balances in the Reserve Banks are paid to the public, and these funds find their way back to banks in the form of deposits. The banks receive reserve credit equal to the full amount of these deposits although the corresponding increase in their required reserves is only 10 percent of this amount.

Operating cash balance of the U.S. Treasury
weekly averages, billions of dollars, not seasonally adjusted



Suppose a government employee deposits a $1,000 expense check in Bank A. The bank sends the check to its Federal Reserve Bank for collection. The Reserve Bank then credits Bank A's reserve account and charges the Treasury's account. As a result, the bank gains both reserves and deposits. While there is no change in the assets or total liabilities of the Reserve Banks, the funds drawn away from the Treasury's balances have been shifted to bank reserve accounts. *See illustration 20.*

One of the objectives of the TT&L note program, which requires depository institutions that want to hold Treasury funds for more than one day to pay interest on them, is to allow the Treasury to hold its balance at the Reserve Banks to the minimum consistent with current payment needs. By maintaining a fairly constant balance, large drains from or additions to bank reserves from wide swings in the Treasury's balance that would require extensive offsetting open market operations can be avoided. Nevertheless, there are still periods when these fluctuations have large reserve effects. In 1991, for example, week-to-week changes in Treasury deposits at the Reserve Banks averaged only $56 million, but ranged from -$4.15 billion to +$8.57 billion.

[8] When the Treasury's balance at the Federal Reserve rises above expected payment needs, the Treasury may place the excess funds in TT&L note accounts through a "direct investment." The accounting entries are the same, but of opposite signs, as those shown when funds are transferred from TT&L note accounts to Treasury deposits at the Fed.

[9] Tax payments received by institutions designated as Federal tax depositaries initially are credited to reservable demand deposits due to the U.S. government. Because such tax payments typically come from reservable transaction accounts, required reserves are not materially affected on this day. On the next business day, however, when these funds are placed either in a nonreservable note account or remitted to the Federal Reserve for credit to the Treasury's balance at the Fed, required reserves decline.

19 When the Treasury builds up its deposits at the Federal Reserve through "calls" on TT&L note balances, reserve accounts are reduced.

FEDERAL RESERVE BANK

Assets		Liabilities	
		Reserve accounts: Bank A	-1,000
		U.S. Treasury deposits	+1,000

BANK A

Assets		Liabilities	
Reserves with F.R. Banks	-1,000	Treasury tax and loan note account	-1,000
Required	*0*		
Deficit	*1,000*		

20 Checks written on the Treasury's account at the Federal Reserve Bank are deposited in banks. As these are collected, banks receive credit to their reserve accounts at the Federal Reserve Banks.

FEDERAL RESERVE BANK

Assets		Liabilities	
		Reserve accounts: Bank A	+1,000
		U.S. Treasury deposits	-1,000

BANK A

Assets		Liabilities	
Reserves with F.R. Banks	+1,000	Private deposits	+1,000
Required	*+100*		
Excess	*+900*		

Changes in Federal Reserve Float

A large proportion of checks drawn on banks and deposited in other banks is cleared (collected) through the Federal Reserve Banks. Some of these checks are credited immediately to the reserve accounts of the depositing banks and are collected the same day by debiting the reserve accounts of the banks on which the checks are drawn. All checks are credited to the accounts of the depositing banks according to availability schedules related to the time it normally takes the Federal Reserve to collect the checks, but rarely more than two business days after they are received at the Reserve Banks, even though they may not yet have been collected due to processing, transportation, or other delays.

The reserve credit given for checks not yet collected is included in Federal Reserve "float."[10] On the books of the Federal Reserve Banks, balance sheet float, or statement float as it is sometimes called, is the difference between the asset account "items in process of collection," and the liability account "deferred credit items." Statement float is usually positive since it is more often the case that reserve credit is given before the checks are actually collected than the other way around.

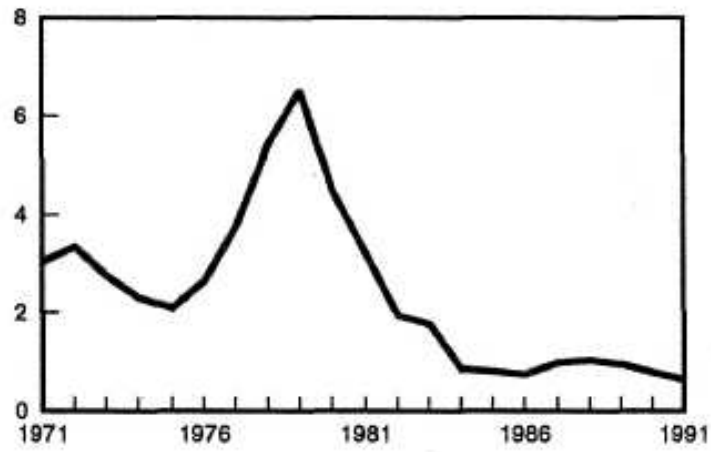
Published data on Federal Reserve float are based on a "reserves-factor" framework rather than a balance sheet accounting framework. As published, Federal Reserve float includes statement float, as defined above, as well as float-related "as-of" adjustments.[11] These adjustments represent corrections for errors that arise in processing transactions related to Federal Reserve priced services. As-of adjustments do not change the balance sheets of either the Federal Reserve Banks or an individual bank. Rather they are corrections to the bank's reserve position, thereby affecting the calculation of whether or not the bank meets its reserve requirements.

An Increase in Federal Reserve Float Increases Bank Reserves

As float rises, total bank reserves rise by the same amount. For example, suppose Bank A receives checks totaling $100 drawn on Banks B, C, and D, all in distant cities. Bank A increases the accounts of its depositors $100, and sends the items to a Federal Reserve Bank for collection. Upon receipt of the checks, the Reserve Bank increases its own asset account "items in process of collection," and increases its liability account "deferred credit items" (checks and other items not yet credited to the sending banks' reserve accounts). As long as these two accounts move together, there is no change in float or in total reserves from this source. *See illustration 21.*

On the next business day (assuming Banks B, C, and D are one-day deferred availability points), the Reserve Bank pays Bank A. The Reserve Bank's "deferred credit items" account is reduced, and Bank A's reserve account is increased $100. If these items actually take more than one business day to collect so that "items in process of collection" are not reduced that day, the credit to Bank A represents an addition to total bank reserves since the reserve accounts of Banks B, C, and D will not have been commensurately reduced.[12] *See illustration 22.*

Federal Reserve float (including as-of adjustments)
annual averages, billions of dollars



A Decline in Federal Reserve Float Reduces Bank Reserves

Only when the checks are actually collected from Banks B, C, and D does the float involved in the above example disappear — "items in process of collection" of the Reserve Bank decline as the reserve accounts of Banks B, C, and D are reduced. *See illustration 23.*

On an annual average basis, Federal Reserve float declined dramatically from 1979 through 1984, in part reflecting actions taken to implement provisions of the Monetary Control Act that directed the Federal Reserve to reduce and price float. *(See chart.)* Since 1984, Federal Reserve float has been fairly stable on an annual average basis, but often fluctuates sharply over short periods. From the standpoint of the effect on bank reserves, the significant aspect of float is not that it exists but that its volume changes in a difficult-to-predict way. Float can increase unexpectedly, for example, if weather conditions ground planes transporting checks to paying banks for collection. However, such periods typically are followed by ones where actual collections exceed new items being received for collection. Thus, reserves gained from float expansion usually are quite temporary.

[10]Federal Reserve float also arises from other funds transfer services provided by the Fed, such as wire transfers, securities transfers, and automatic clearinghouse transfers.

[11]As-of adjustments also are used as one means of pricing float, as discussed on page 22, and for nonfloat-related corrections, as discussed on page 35.

[12]If the checks received from Bank A had been erroneously assigned a two-day deferred availability, then neither statement float nor reserves would increase, although both should. Bank A's reserve position and published Federal Reserve float data are corrected for this and similar errors through as-of adjustments.

21 When a bank receives deposits in the form of checks drawn on other banks, it can send them to the Federal Reserve Bank for collection. (Required reserves are not affected immediately because requirements apply to *net* transaction accounts, i.e., total transaction accounts minus both cash items in process of collection and deposits due from domestic depository institutions.)

FEDERAL RESERVE BANK

Assets		Liabilities	
Items in process of collection	+100	Deferred credit items	+100

BANK A

Assets		Liabilities	
Cash items in process of collection	+100	Deposits	+100

22 If the reserve account of the payee bank is credited before the reserve accounts of the paying banks are debited, total reserves increase.

FEDERAL RESERVE BANK

Assets		Liabilities	
		Deferred credit items	-100
		Reserve accounts: Bank A	+100 ←

BANK A

Assets		Liabilities	
Cash items in process of collection	-100		
Reserves with F.R. Banks	+100 →		
Required	*+10*		
Excess	*+90*		

23 But upon actual collection of the items, accounts of the paying banks are charged, and total reserves decline.

FEDERAL RESERVE BANK

Assets		Liabilities	
Items in process of collection	-100	Reserve accounts: Bank B, Bank C, Bank D	-100 ←

BANKS B, C, AND D

Assets		Liabilities	
Reserves with F.R. Banks	-100 →	Deposits	-100
Required	*-10*		
Deficit	*90*		

Changes in Service-Related Balances and Adjustments

In order to foster a safe and efficient payments system, the Federal Reserve offers banks a variety of payments services. Prior to passage of the Monetary Control Act in 1980, the Federal Reserve offered its services free, but only to banks that were members of the Federal Reserve System. The Monetary Control Act directed the Federal Reserve to offer its services to all depository institutions, to charge for these services, and to reduce and price Federal Reserve float.[13] Except for float, all services covered by the Act were priced by the end of 1982. Implementation of float pricing essentially was completed in 1983.

The advent of Federal Reserve priced services led to several changes that affect the use of funds in banks' reserve accounts. As a result, only part of the total balances in bank reserve accounts is identified as "reserve balances" available to meet reserve requirements. Other balances held in reserve accounts represent "service-related balances and adjustments (to compensate for float)." Service-related balances are "required clearing balances" held by banks that use Federal Reserve services while "adjustments" represent balances held by banks that pay for float with as-of adjustments.

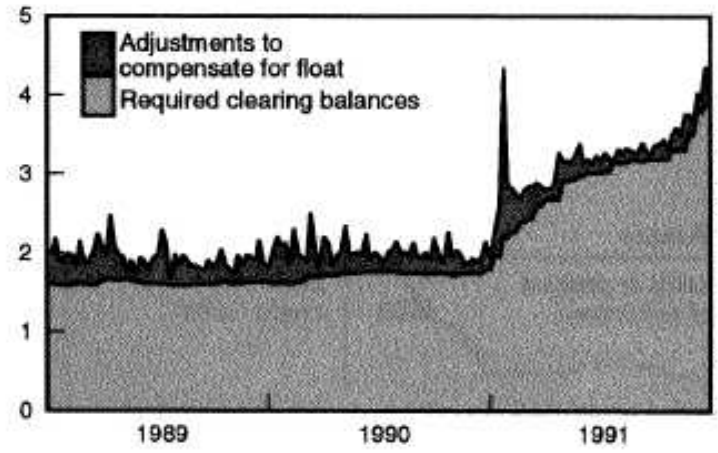
An Increase in Required Clearing Balances Reduces Reserve Balances

Procedures for establishing and maintaining clearing balances were approved by the Board of Governors of the Federal Reserve System in February 1981. A bank may be required to hold a clearing balance if it has no required reserve balance or if its required reserve balance (held to satisfy reserve requirements) is not large enough to handle its volume of clearings. Typically a bank holds both reserve balances and required clearing balances in the same reserve account. Thus, as required clearing balances are established or increased, the amount of funds in reserve accounts identified as reserve balances declines.

Suppose Bank A wants to use Federal Reserve services but has a reserve balance requirement that is less than its expected operating needs. With its Reserve Bank, it is determined that Bank A must maintain a required clearing balance of $1,000. If Bank A has no excess reserve balance, it will have to obtain funds from some other source. Bank A could sell $1,000 of securities, but this will reduce the amount of total bank reserve balances and deposits. *See illustration 24.*

Banks are billed each month for the Federal Reserve services they have used with payment collected on a specified day the following month. All required clearing balances held generate "earnings credits" which can be used only to offset charges for Federal Reserve services.[14] Alternatively, banks can pay for services through a direct charge to their reserve accounts. If accrued earnings credits are used to pay for services, then reserve balances are unaffected. On the other hand, if payment for services takes the form of a direct charge to the bank's reserve account, then reserve balances decline. *See illustration 25.*

Service-related balances and adjustments
weekly averages, billions of dollars, not seasonally adjusted



Float Pricing As-Of Adjustments Reduce Reserve Balances

In 1983, the Federal Reserve began pricing explicitly for float,[15] specifically "interterritory" check float, i.e., float generated by checks deposited by a bank served by one Reserve Bank but drawn on a bank served by another Reserve Bank. The depositing bank has three options in paying for interterritory check float it generates. It can use its earnings credits, authorize a direct charge to its reserve account, or pay for the float with an as-of adjustment. If either of the first two options is chosen, the accounting entries are the same as paying for other priced services. If the as-of adjustment option is chosen, however, the balance sheets of the Reserve Banks and the bank are not directly affected. In effect what happens is that part of the total balances held in the bank's reserve account is identified as being held to compensate the Federal Reserve for float. This part, then, cannot be used to satisfy either reserve requirements or clearing balance requirements. Float pricing as-of adjustments are applied two weeks after the related float is generated. Thus, an individual bank has sufficient time to obtain funds from other sources in order to avoid any reserve deficiencies that might result from float pricing as-of adjustments. If all banks together have no excess reserves, however, the float pricing as-of adjustments lead to a decline in total bank reserve balances.

Week-to-week changes in service-related balances and adjustments can be volatile, primarily reflecting adjustments to compensate for float. *(See chart.)* Since these changes are known in advance, any undesired impact on reserve balances can be offset easily through open market operations.

[13]The Act specified that fee schedules cover services such as check clearing and collection, wire transfer, automated clearinghouse, settlement, securities safekeeping, noncash collection, Federal Reserve float, and any new services offered.

[14]"Earnings credits" are calculated by multiplying the actual average clearing balance held over a maintenance period, up to that required plus the clearing balance band, times a rate based on the average federal funds rate. The clearing balance band is 2 percent of the required clearing balance or $25,000, whichever amount is larger.

[15]While some types of float are priced directly, the Federal Reserve prices other types of float indirectly, for example, by including the cost of float in the per-item fees for the priced service.

24 When Bank A establishes a required clearing balance at a Federal Reserve Bank by selling securities, the reserve balances and deposits of other banks decline.

BANK A

Assets		Liabilities	
U.S. government securities	- 1,000		
Reserve account with F.R. Banks:			
Required clearing balance	+ 1,000		

FEDERAL RESERVE BANK

Assets		Liabilities	
		Reserve accounts:	
		Required clearing balances:	
		Bank A	+ 1,000
		Reserve balances:	
		Other banks	- 1,000

OTHER BANKS

Assets		Liabilities	
Reserve accounts with F.R. Banks:		Deposits	- 1,000
Reserve balances	- 1,000		
Required	*-100*		
Deficit	*900*		

25 When Bank A is billed monthly for Federal Reserve services used, it can pay for these services by having earnings credits applied and/or by authorizing a direct charge to its reserve account. Suppose Bank A has accrued earnings credits of $100 but incurs fees of $125. Then both methods would be used. On the Federal Reserve Bank's books, the liability account "earnings credits due to depository institutions" declines by $100 and Bank A's reserve account is reduced by $25. Offsetting these entries is a reduction in the Fed's (other) asset account "accrued service income." On Bank A's books, the accounting entries might be a $100 reduction to its asset account "earnings credit due from Federal Reserve Banks" and a $25 reduction in its reserve account, which are offset by a $125 decline in its liability "accounts payable." While an individual bank may use different accounting entries, the net effect on reserves is a reduction of $25, the amount of billed fees that were paid through a direct charge to Bank A's reserve account.

FEDERAL RESERVE BANK

Assets		Liabilities	
Accrued service income	- 125	Earnings credits due to depository institutions	- 100
		Reserve accounts: Bank A	- 25

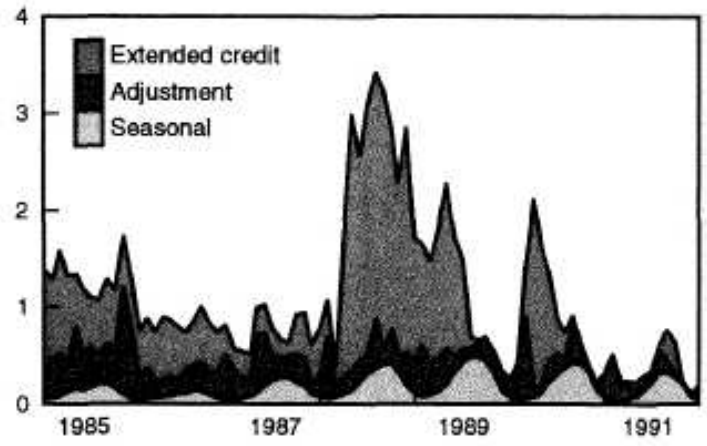
BANK A

Assets		Liabilities	
Earnings credits due from F.R. Banks	- 100	Accounts payable	- 125
Reserves with F.R. Banks	- 25		

Changes in Loans to Depository Institutions

Prior to passage of the Monetary Control Act of 1980, only banks that were members of the Federal Reserve System had regular access to the Fed's "discount window." Since then, all institutions having deposits reservable under the Act also have been able to borrow from the Fed. Under conditions set by the Federal Reserve, loans are available under three credit programs: adjustment, seasonal, and extended credit.[16] The average amount of each type of discount window credit provided varies over time. *(See chart.)*

Loans to depository institutions
monthly averages, billions of dollars, not seasonally adjusted



When a bank borrows from a Federal Reserve Bank, it borrows reserves. The acquisition of reserves in this manner differs in an important way from the cases already illustrated. Banks normally borrow adjustment credit only to avoid reserve deficiencies or overdrafts, not to obtain excess reserves. Adjustment credit borrowings, therefore, are reserves on which expansion has already taken place. How can this happen?

In their efforts to accommodate customers as well as to keep fully invested, banks frequently make loans in anticipation of inflows of loanable funds from deposits or money market sources. Loans add to bank deposits but not to bank reserves. Unless excess reserves can be tapped, banks will not have enough reserves to meet the reserve requirements against the new deposits. Likewise, individual banks may incur deficiencies through unexpected deposit outflows and corresponding losses of reserves through clearings. Other banks receive these deposits and can increase their loans accordingly, but the banks that lost them may not be able to reduce outstanding loans or investments in order to restore their reserves to required levels within the required time period. In either case, a bank may borrow reserves temporarily from its Reserve Bank.

Suppose a customer of Bank A wants to borrow $100. On the basis of the management's judgment that the bank's reserves will be sufficient to provide the necessary funds, the customer is accommodated. The loan is made by increasing "loans" and crediting the customer's deposit account. Now Bank A's deposits have increased by $100. However, if reserves are insufficient to support the higher deposits, Bank A will have a $10 reserve deficiency, assuming requirements of 10 percent. *See illustration 26.* Bank A may temporarily borrow the $10 from its Federal Reserve Bank, which makes a loan by increasing its asset item "loans to depository institutions" and crediting Bank A's reserve account. Bank A gains reserves and a corresponding liability "borrowings from Federal Reserve Banks." *See illustration 27.*

To repay borrowing, a bank must gain reserves through either deposit growth or asset liquidation. *See illustration 28.* A bank makes payment by authorizing a debit to its reserve account at the Federal Reserve Bank. Repayment of borrowing, therefore, reduces both reserves and "borrowings from Federal Reserve Banks." *See illustration 29.*

Unlike loans made under the seasonal and extended credit programs, adjustment credit loans to banks generally must be repaid within a short time since such loans are made primarily to cover needs created by temporary fluctuations in deposits and loans relative to usual patterns. Adjustments, such as sales of securities, made by some banks to "get out of the window" tend to transfer reserve shortages to other banks and may force these other banks to borrow, especially in periods of heavy credit demands. Even at times when the total volume of adjustment credit borrowing is rising, some individual banks are repaying loans while others are borrowing. In the aggregate, adjustment credit borrowing usually increases in periods of rising business activity when the public's demands for credit are rising more rapidly than nonborrowed reserves are being provided by System open market operations.

Discount Window as a Tool of Monetary Policy

Although reserve expansion through borrowing is initiated by banks, the amount of reserves that banks can acquire in this way ordinarily is limited by the Federal Reserve's administration of the discount window and by its control of the rate charged banks for adjustment credit loans — the discount rate.[17] Loans are made only for approved purposes, and other reasonably available sources of funds must have been fully used. Moreover, banks are discouraged from borrowing adjustment credit too frequently or for extended time periods. Raising the discount rate tends to restrain borrowing by increasing its cost relative to the cost of alternative sources of reserves.

Discount window administration is an important adjunct to the other Federal Reserve tools of monetary policy. While the privilege of borrowing offers a "safety valve" to temporarily relieve severe strains on the reserve positions of individual banks, there is generally a strong incentive for a bank to repay borrowing before adding further to its loans and investments.

[16]Adjustment credit is short-term credit available to meet temporary needs for funds. Seasonal credit is available for longer periods to smaller institutions having regular seasonal needs for funds. Extended credit may be made available to an institution or group of institutions experiencing sustained liquidity pressures. The reserves provided through extended credit borrowing typically are offset by open market operations.

[17]Flexible discount rates related to rates on money market sources of funds currently are charged for seasonal credit and for extended credit outstanding more than 30 days.

26 A bank may incur a reserve deficiency if it makes loans when it has no excess reserves.

BANK A

Assets		Liabilities	
Loans	+100	Deposits	+100
Reserves with F.R. Banks	no change		
Required	*+10*		
Deficit	*10*		

27 Borrowing from a Federal Reserve Bank to cover such a deficit is accompanied by a direct credit to the bank's reserve account.

FEDERAL RESERVE BANK

Assets		Liabilities	
Loans to depository institutions: Bank A	+ 10	Reserve accounts: Bank A	+ 10

BANK A

Assets		Liabilities	
Reserves with F.R. Banks	+ 10	Borrowings from F.R. Banks	+ 10

No further expansion can take place on the new reserves because they are all needed against the deposits created in (26).

28 Before a bank can repay borrowings, it must gain reserves from some other source.

BANK A

Assets		Liabilities
Securities	- 10	
Reserves with F.R. Banks	+ 10	

29 Repayment of borrowings from the Federal Reserve Bank reduces reserves.

FEDERAL RESERVE BANK

Assets		Liabilities	
Loans to depository institutions: Bank A	- 10	Reserve accounts: Bank A	- 10

BANK A

Assets		Liabilities	
Reserves with F.R. Banks	- 10	Borrowings from F.R. Banks	- 10

Changes in Reserve Requirements

Thus far we have described transactions that affect the volume of bank reserves and the impact these transactions have upon the capacity of the banks to expand their assets and deposits. It is also possible to influence deposit expansion or contraction by changing the required minimum ratio of reserves to deposits.

The authority to vary required reserve percentages for banks that were members of the Federal Reserve System (member banks) was first granted by Congress to the Federal Reserve Board of Governors in 1933. The ranges within which this authority can be exercised have been changed several times, most recently in the Monetary Control Act of 1980, which provided for the establishment of reserve requirements that apply uniformly to all depository institutions. The 1980 statute established the following limits:

On transaction accounts	
first $25 million	*3%*
above $25 million	*8% to 14%*
On nonpersonal time deposits	*0% to 9%*

The 1980 law initially set the requirement against transaction accounts over $25 million at 12 percent and that against nonpersonal time deposits at 3 percent. The initial $25 million "low reserve tranche" was indexed to change each year in line with 80 percent of the growth in transaction accounts at all depository institutions. (For example, the low reserve tranche was increased from $41.1 million for 1991 to $42.2 million for 1992.) In addition, reserve requirements can be imposed on certain nondeposit sources of funds, such as Eurocurrency liabilities.[18] (Initially the Board set a 3 percent requirement on Eurocurrency liabilities.)

The Garn-St Germain Act of 1982 modified these provisions somewhat by exempting from reserve requirements the first $2 million of total reservable liabilities at each depository institution. Similar to the low reserve tranche adjustment for transaction accounts, the $2 million "reservable liabilities exemption amount" was indexed to 80 percent of annual increases in total reservable liabilities. (For example, the exemption amount was increased from $3.4 million for 1991 to $3.6 million for 1992.)

The Federal Reserve Board is authorized to change, at its discretion, the percentage requirements on transaction accounts above the low reserve tranche and on nonpersonal time deposits within the ranges indicated above. In addition, the Board may impose differing reserve requirements on nonpersonal time deposits based on the maturity of the deposit. (The Board initially imposed the 3 percent nonpersonal time deposit requirement only on such deposits with original maturities of under four years.)

During the phase-in period, which ended in 1984 for most member banks and in 1987 for most nonmember institutions, requirements changed according to a predetermined schedule, without any action by the Federal Reserve Board. Apart from these legally prescribed changes, once the Monetary Control Act provisions were implemented in late 1980, the Board did not change any reserve requirement ratios until late 1990. (The original maturity break for requirements on nonpersonal time deposits was shortened several times, once in 1982 and twice in 1983, in connection with actions taken to deregulate rates paid on deposits.) In December 1990, the Board reduced reserve requirements against nonpersonal time deposits and Eurocurrency liabilities from 3 percent to zero. Effective in April 1992, the reserve requirement on transaction accounts above the low reserve tranche was lowered from 12 percent to 10 percent.

When reserve requirements are lowered, a portion of banks' existing holdings of required reserves becomes excess reserves and may be loaned or invested. For example, with a requirement of 10 percent, $10 of reserves would be required to support $100 of deposits. *See illustration 30.* But a reduction in the legal requirement to 8 percent would tie up only $8, freeing $2 out of each $10 of reserves for use in creating additional bank credit and deposits. *See illustration 31.*

An increase in reserve requirements, on the other hand, absorbs additional reserve funds, and banks which have no excess reserves must acquire reserves or reduce loans or investments to avoid a reserve deficiency. Thus an increase in the requirement from 10 percent to 12 percent would boost required reserves to $12 for each $100 of deposits. Assuming banks have no excess reserves, this would force them to liquidate assets until the reserve deficiency was eliminated, at which point deposits would be one-sixth less than before. *See illustration 32.*

Reserve Requirements and Monetary Policy

The power to change reserve requirements, like purchases and sales of securities by the Federal Reserve, is an instrument of monetary policy. Even a small change in requirements — say, one-half of one percentage point — can have a large and widespread impact. Other instruments of monetary policy have sometimes been used to cushion the initial impact of a reserve requirement change. Thus, the System may sell securities (or purchase less than otherwise would be appropriate) to absorb part of the reserves released by a cut in requirements.

It should be noted that in addition to their initial impact on excess reserves, changes in requirements alter the expansion power of every reserve dollar. Thus, such changes affect the leverage of all subsequent increases or decreases in reserves from any source. For this reason, changes in the total volume of bank reserves actually held between points in time when requirements differ do not provide an accurate indication of the Federal Reserve's policy actions.

Both reserve balances and vault cash are eligible to satisfy reserve requirements. To the extent some institutions normally hold vault cash to meet operating needs in amounts exceeding their required reserves, they are unlikely to be affected by any change in requirements.

[18]The 1980 statute also provides that "under extraordinary circumstances" reserve requirements can be imposed at any level on any liability of depository institutions for as long as six months; and, if essential for the conduct of monetary policy, supplemental requirements up to 4 percent of transaction accounts can be imposed.

30 Under a 10 percent reserve requirement, $10 of reserves are needed to support each $100 of deposits.

BANK A

Assets			Liabilities	
Loans and investments		90	Deposits	100
Reserves		10		
Required	*10*			
Excess	*0*			

31 With a reduction in requirements from 10 percent to 8 percent, fewer reserves are required against the same volume of deposits so that excess reserves are created. These can be loaned or invested.

BANK A

Assets			Liabilities	
Loans and investments		90	Deposits	100
Reserves		10		
Required	*8*			
Excess	*2*			

FEDERAL RESERVE BANK

Assets	Liabilities
NO CHANGE	

There is no change in the total amount of bank reserves.

32 With an increase in requirements from 10 percent to 12 percent, more reserves are required against the same volume of deposits. The resulting deficiencies must be covered by liquidation of loans or investments . . .

BANK A

Assets			Liabilities	
Loans and investments		90	Deposits	100
Reserves		10		
Required	*12*			
Deficit	*2*			

FEDERAL RESERVE BANK

Assets	Liabilities
NO CHANGE	

. . .because the total amount of bank reserves remains unchanged.

Changes in Foreign-Related Factors

The Federal Reserve has engaged in foreign currency operations for its own account since 1962. In addition, it acts as the agent for foreign currency transactions of the U.S. Treasury, and since the 1950s has executed transactions for customers such as foreign central banks. Perhaps the most publicized type of foreign currency transaction undertaken by the Federal Reserve is intervention in the foreign exchange markets. Intervention, however, is only one of several foreign-related transactions that have the potential for increasing or decreasing reserves of banks, thereby affecting money and credit growth.

Several foreign-related transactions and their effects on U.S. bank reserves are described in the next few pages. Included are some but not all of the types of transactions used. The key point to remember, however, is that the Federal Reserve routinely offsets any undesired change in U.S bank reserves resulting from foreign-related transactions. As a result, such transactions do not affect money and credit growth in the United States.

Foreign Exchange Intervention for the Federal Reserve's Own Account

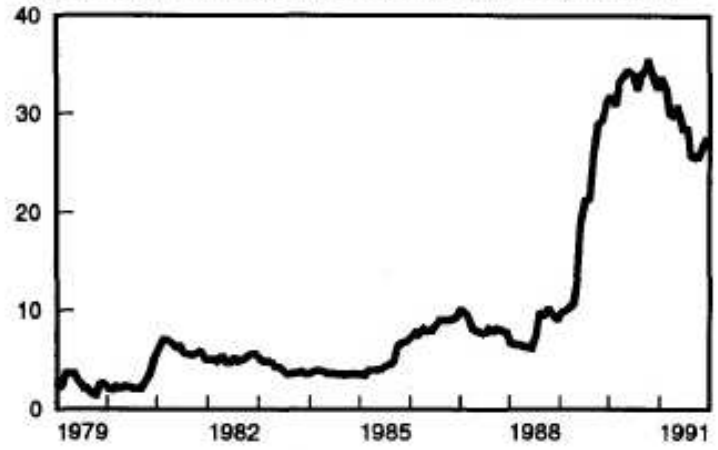
When the Federal Reserve intervenes in foreign exchange markets to sell dollars for its own account,[19] it acquires foreign currency assets and reserves of U.S. banks initially rise. In contrast, when the Fed intervenes to buy dollars for its own account, it uses foreign currency assets to pay for the dollars purchased and reserves of U.S. banks initially fall.

Consider the example where the Federal Reserve intervenes in the foreign exchange markets to sell $100 of U.S. dollars for its own account. In this transaction, the Federal Reserve buys a foreign-currency-denominated deposit of a U.S. bank held at a foreign commercial bank,[20] and pays for this foreign currency deposit by crediting $100 to the U.S. bank's reserve account at the Fed. The Federal Reserve deposits the foreign currency proceeds in its account at a Foreign Central Bank, and as this transaction clears, the foreign bank's reserves at the Foreign Central Bank decline. *See illustration 33 on pages 30-31.* Initially, then, the Fed's intervention sale of dollars in this example leads to an increase in Federal Reserve Bank assets denominated in foreign currencies and an increase in reserves of U.S. banks.

Suppose instead that the Federal Reserve intervenes in the foreign exchange markets to buy $100 of U.S. dollars, again for its own account. The Federal Reserve purchases a dollar-denominated deposit of a foreign bank held at a U.S. bank, and pays for this dollar deposit by drawing on its foreign currency deposit at a Foreign Central Bank. (The Federal Reserve might have to sell some of its foreign currency investments to build up its deposits at the Foreign Central Bank, but this would not affect U.S. bank reserves.) As the Federal Reserve's account at the Foreign Central Bank is charged, the foreign bank's reserves at the Foreign Central Bank increase. In turn, the dollar deposit of the foreign bank at the U.S. bank declines as the U.S. bank transfers ownership of those dollars to the Federal Reserve via a $100 charge to its reserve account at the Federal Reserve. *See illustration 34 on pages 30-31.* Initially, then, the Fed's intervention purchase of dollars in this example leads to a decrease in Federal Reserve Bank assets denominated in foreign currencies and a decrease in reserves of U.S. banks.

Federal Reserve Bank assets denominated in foreign currencies

end of month, billions of dollars, not seasonally adjusted



As noted earlier, the Federal Reserve offsets or "sterilizes" any undesired change in U.S. bank reserves stemming from foreign exchange intervention sales or purchases of dollars. For example, Federal Reserve Bank assets denominated in foreign currencies rose dramatically in 1989, in part due to significant U.S. intervention sales of dollars. *(See chart on this page.)* Total reserves of U.S. banks, however, declined slightly in 1989 as open market operations were used to "sterilize" the initial intervention-induced increase in reserves.

Monthly Revaluation of Foreign Currency Assets

Another set of accounting transactions that affects Federal Reserve Bank assets denominated in foreign currencies is the monthly revaluation of such assets. Two business days prior to the end of the month, the Fed's foreign currency assets are increased if their market value has appreciated or decreased if their value has depreciated. The offsetting accounting entry on the Fed's balance sheet is to the "exchange-translation account" included in "other F.R. liabilities." These changes in the Fed's balance sheet do not alter bank reserves directly. However, since the Federal Reserve turns over its net earnings to the Treasury each week, the revaluation affects the amount of the Fed's payment to the Treasury, which in turn influences the size of TT&L calls and bank reserves. (See explanation on pages 18 and 19.)

[19]Overall responsibility for U.S. intervention in foreign exchange markets rests with the U.S. Treasury. Foreign exchange transactions for the Federal Reserve's account are carried out under directives issued by the Federal Reserve's Open Market Committee within the general framework of exchange rate policy established by the U.S. Treasury in consultation with the Fed. They are implemented at the Federal Reserve Bank of New York, typically at the same time that similar transactions are executed for the Treasury's Exchange Stabilization Fund.

[20]Americans traveling to foreign countries engage in "foreign exchange" transactions whenever they obtain foreign coins and paper currency in exchange for U.S. coins and currency. However, most foreign exchange transactions do not involve the physical exchange of coins and currency. Rather, most of these transactions represent the buying and selling of foreign currencies by exchanging one bank deposit denominated in one currency for another bank deposit denominated in another currency. For ease of exposition, the examples assume that U.S. banks and foreign banks are the market participants in the intervention transactions, but the impact on reserves would be the same if the U.S. or foreign public were involved.

Foreign-Related Transactions for the Treasury

U.S. intervention in foreign exchange markets by the Federal Reserve usually is divided between its own account and the Treasury's Exchange Stabilization Fund (ESF) account. The impact on U.S. bank reserves from the intervention transaction is the same for both — sales of dollars add to reserves while purchases of dollars drain reserves. *See illustration 35 on pages 30-31.* Depending upon how the Treasury pays for, or finances, its part of the intervention, however, the Federal Reserve may not need to conduct offsetting open market operations.

The Treasury typically keeps only minimal balances in the ESF's account at the Federal Reserve. Therefore, the Treasury generally has to convert some ESF assets into dollar or foreign currency deposits in order to pay for its part of an intervention transaction. Likewise, the dollar or foreign currency deposits acquired by the ESF in the intervention typically are drawn down when the ESF invests the proceeds in earning assets.

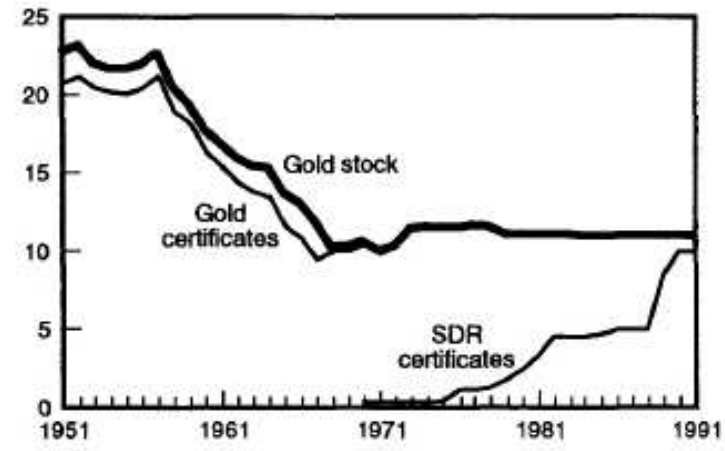
For example, to finance an intervention sale of dollars (such as that shown in illustration 35), the Treasury might redeem some of the U.S. government securities issued to the ESF, resulting in a transfer of funds from the Treasury's (general account) balances at the Federal Reserve to the ESF's account at the Fed. (On the Federal Reserve's balance sheet, the ESF's account is included in the liability category "other deposits.") The Treasury, however, would need to replenish its Fed balances to desired levels, perhaps by increasing the size of TT&L calls — a transaction that drains U.S. bank reserves. The intervention and financing transactions essentially occur simultaneously. As a result, U.S. bank reserves added in the intervention sale of dollars are offset by the drain in U.S. bank reserves from the TT&L call. *See illustrations 35 and 36 on pages 30-31.* Thus, no Federal Reserve offsetting actions would be needed if the Treasury financed the intervention sale of dollars through a TT&L call on banks.

Offsetting actions by the Federal Reserve would be needed, however, if the Treasury restored deposits affected by foreign-related transactions through a number of transactions involving the Federal Reserve. These include the Treasury's issuance of SDR or gold certificates to the Federal Reserve and the "warehousing" of foreign currencies by the Federal Reserve.

SDR certificates. Occasionally the Treasury acquires dollar deposits for the ESF's account by issuing certificates to the Federal Reserve against allocations of Special Drawing Rights (SDRs) received from the International Monetary Fund.[21] For example, $3.5 billion of SDR certificates were issued in 1989, and another $1.5 billion in 1990. This "monetization" of SDRs is reflected on the Federal Reserve's balance sheet as an increase in its asset "SDR certificate account" and an increase in its liability "other deposits (ESF account)."

If the ESF uses these dollar deposits directly in an intervention sale of dollars, then the intervention-induced increase in U.S. bank reserves is not altered. *See illustrations 35 and 37 on pages 30-31.* If not needed immediately for an intervention transaction, the ESF might use the dollar deposits from issuance of SDR certificates to buy securities

U.S gold stock, gold certificates and SDR certificates
end of year, billions of dollars



from the Treasury, resulting in a transfer of funds from the ESF's account at the Federal Reserve to the Treasury's account at the Fed. U.S. bank reserves would then increase as the Treasury spent the funds or transferred them to banks through a direct investment to TT&L note accounts.

Gold stock and gold certificates. Changes in the U.S. monetary gold stock used to be an important factor affecting bank reserves. However, the gold stock and gold certificates issued to the Federal Reserve in "monetizing" gold, have not changed significantly since the early 1970s. *(See chart on this page.)*

Prior to August 1971, the Treasury bought and sold gold for a fixed price in terms of U.S. dollars, mainly at the initiative of foreign central banks and governments. Gold purchases by the Treasury were added to the U.S. monetary gold stock, and paid for from its account at the Federal Reserve. As the sellers deposited the Treasury's checks in banks, reserves increased. To replenish its balance at the Fed, the Treasury issued gold certificates to the Federal Reserve and received a credit to its deposit balance.

Treasury sales of gold have the opposite effect. Buyers' checks are credited to the Treasury's account and reserves decline. Because the official U.S. gold stock is now fully "monetized," the Treasury currently has to use its deposits to retire gold certificates issued to the Federal Reserve whenever gold is sold. However, the value of gold certificates retired, as well as the net contraction in bank reserves, is based on the official gold price. Proceeds from a gold sale at the market price to meet demands of domestic buyers likely would be greater. The difference represents the Treasury's profit, which, when spent, restores deposits and bank reserves by a like amount.

While the Treasury no longer purchases gold and sales of gold have been limited, increases in the official price of gold have added to the value of the gold stock. (The official gold price was last raised, from $38.00 to $42.22 per troy ounce, in 1973.)

Warehousing. The Treasury sometimes acquires dollar deposits at the Federal Reserve by "warehousing" foreign currencies with the Fed. (For example, $7 billion of foreign

[21]SDRs were created in 1970 for use by governments in official balance of payments transactions.

33 When the Federal Reserve intervenes to sell dollars for its own account, it pays for a foreign-currency-denominated deposit of a U.S. bank at a foreign commercial bank by crediting the reserve account of the U.S. bank, and acquires a foreign currency asset in the form of a deposit at a Foreign Central Bank. The Federal Reserve, however, will offset the increase in U.S. bank reserves if it is inconsistent with domestic policy objectives.

FEDERAL RESERVE BANK

Assets		Liabilities	
Deposits at Foreign Central Bank	+ 100	Reserves: U.S. bank	+ 100 ←

34 When the Federal Reserve intervenes to buy dollars for its own account, it draws down its foreign currency deposits at a Foreign Central Bank to pay for a dollar-denominated deposit of a foreign bank at a U.S. bank, which leads to a contraction in reserves of the U.S. bank. This reduction in reserves will be offset by the Federal Reserve if it is inconsistent with domestic policy objectives.

FEDERAL RESERVE BANK

Assets		Liabilities	
Deposits at Foreign Central Bank	- 100	Reserves: U.S. bank	- 100 ←

35 In an intervention sale of dollars for the U.S. Treasury, deposits of the ESF at the Federal Reserve are used to pay for a foreign currency deposit of a U.S. bank at a foreign bank, and the foreign currency proceeds are deposited in an account at a Foreign Central Bank. U.S. bank reserves increase as a result of this intervention transaction.

ESF

Assets		Liabilities	
Deposits at F.R. Banks	- 100		
Deposits at Foreign Central Bank	+ 100		

U.S. TREASURY

Assets		Liabilities	

FEDERAL RESERVE BANK

Assets		Liabilities	
		Reserves: U.S. bank	+ 100 ←
		Other deposits: ESF	- 100

36 Concurrently, the Treasury must finance the intervention transaction in (35). The Treasury might build up deposits in the ESF's account at the Federal Reserve by redeeming securities issued to the ESF, and replenish its own (general account) deposits at the Federal Reserve to desired levels by issuing a call on TT&L note accounts. This set of transactions drains reserves of U.S. banks by the same amount as the intervention in (35) added to U.S. bank reserves.

ESF

Assets		Liabilities	
U.S. govt. securities	- 100		
Deposits at F.R. Banks	+ 100		

U.S. TREASURY

Assets		Liabilities	
TT&L accts.	- 100	Securities issued ESF	- 100
Deposits at F.R. Banks	net 0		
[from U.S. bank	*+100]*		
[to ESF	*-100]*		

FEDERAL RESERVE BANK

Assets		Liabilities	
		Reserves: U.S. banks	- 100 ←
		Treas. deps.:	net 0
		[from U.S. bank	*+100]*
		[to ESF	*-100]*
		Other deposits: ESF	+ 100

37 Alternatively, the Treasury might finance the intervention in (35) by issuing SDR certificates to the Federal Reserve, a transaction that would not disturb the addition of U.S. bank reserves in intervention (35). The Federal Reserve, however, would offset any undesired change in U.S. bank reserves.

ESF

Assets		Liabilities	
Deposits at F.R. Banks	+ 100	SDR certificates issued to F.R. Banks	+ 100

U.S. TREASURY

Assets		Liabilities	

FEDERAL RESERVE BANK

Assets		Liabilities	
SDR certificate account	+ 100	Other deposits: ESF	+ 100

U.S. BANK

Assets		Liabilities	
Reserves with F.R. Banks	+ 100		
Deposits at foreign bank	- 100		

FOREIGN BANK

Assets		Liabilities	
Reserves with Foreign Central Bank	- 100	Deposits of U.S. bank	- 100

FOREIGN CENTRAL BANK

Assets		Liabilities	
		Deposits of F.R. Banks	+ 100
		Reserves of foreign bank	- 100

U.S. BANK

Assets		Liabilities	
Reserves with F.R. Banks	- 100	Deposits of foreign bank	- 100

FOREIGN BANK

Assets		Liabilities	
Deposits at U.S. bank	- 100		
Reserves with Foreign Central Bank	+ 100		

FOREIGN CENTRAL BANK

Assets		Liabilities	
		Deposits of F.R. Banks	- 100
		Reserves of foreign bank	+ 100

U.S. BANK

Assets		Liabilities	
Reserves with F.R. Banks	+ 100		
Deposits at foreign bank	- 100		

FOREIGN BANK

Assets		Liabilities	
Reserves with Foreign Central Bank	- 100	Deposits of U.S. bank	- 100

FOREIGN CENTRAL BANK

Assets		Liabilities	
		Deposits of ESF	+ 100
		Reserves of foreign bank	- 100

U.S. BANK

Assets		Liabilities	
Reserves with F.R. Banks	- 100	TT&L accts.	- 100

U.S. BANK

Assets	Liabilities
NO CHANGE	

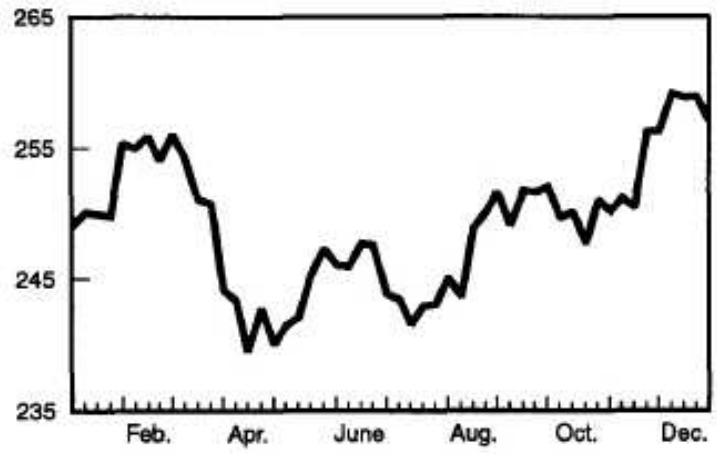
currencies were warehoused in 1989.) The Treasury or ESF acquires foreign currency assets as a result of transactions such as intervention sales of dollars or sales of U.S. government securities denominated in foreign currencies. When the Federal Reserve warehouses foreign currencies for the Treasury,[22] "Federal Reserve Bank assets denominated in foreign currencies" increase as do Treasury deposits at the Fed. As these deposits are spent, reserves of U.S. banks rise. In contrast, the Treasury likely will have to increase the size of TT&L calls — a transaction that drains reserves — when it repurchases warehoused foreign currencies from the Federal Reserve. (In 1991, $2.5 billion of warehoused foreign currencies were repurchased.) The repurchase transaction is reflected on the Fed's balance sheet as declines in both Treasury deposits at the Federal Reserve and Federal Reserve Bank assets denominated in foreign currencies.

Transactions for Foreign Customers

Many foreign central banks and governments maintain deposits at the Federal Reserve to facilitate dollar-denominated transactions. These "foreign deposits" on the liability side of the Fed's balance sheet typically are held at minimal levels that vary little from week to week. For example, foreign deposits at the Federal Reserve averaged only $237 million in 1991, ranging from $178 million to $319 million on a weekly average basis. Changes in foreign deposits are small because foreign customers "manage" their Federal Reserve balances to desired levels daily by buying and selling U.S. government securities. The extent of these foreign customer "cash management" transactions is reflected, in part, by large and frequent changes in marketable U.S. government securities held in custody by the Federal Reserve for foreign customers. *(See chart.)* The net effect of foreign customers' cash management transactions usually is to leave U.S. bank reserves unchanged.

Managing foreign deposits through sales of securities. Foreign customers of the Federal Reserve make dollar-denominated payments, including those for intervention sales of dollars by foreign central banks, by drawing down their deposits at the Federal Reserve. As these funds are deposited in U.S. banks and cleared, reserves of U.S. banks rise. *See illustration 38.* However, if payments from their accounts at the Federal Reserve lower balances to below desired levels, foreign customers will replenish their Federal Reserve deposits by selling U.S. government securities. Acting as their agent, the Federal Reserve usually executes foreign customers' sell orders in the market. As buyers pay for the securities by drawing down deposits at U.S. banks, reserves of U.S. banks fall and offset the increase in reserves from the disbursement transactions. The net effect is to leave U.S. bank reserves unchanged when U.S. government securities of foreign customers are sold in the market. *See illustrations 38 and 39.* Occasionally, however, the Federal Reserve executes foreign customers' sell orders with the System's account. When this is done, the rise in reserves from the foreign customers' disbursement of funds remains in place. *See illustrations 38 and 40.* The Federal Reserve might choose to execute sell orders with the System's account if an increase in reserves is desired for domestic policy reasons.

Marketable U.S government securities held in custody for foreign customers during 1991
Wednesday outstandings, billions of dollars



Managing foreign deposits through purchases of securities. Foreign customers of the Federal Reserve also receive a variety of dollar-denominated payments, including proceeds from intervention purchases of dollars by foreign central banks, that are drawn on U.S. banks. As these funds are credited to foreign deposits at the Federal Reserve, reserves of U.S. banks decline. But if receipts of dollar-denominated payments raise their deposits at the Federal Reserve to levels higher than desired, foreign customers will buy U.S. government securities. The net effect generally is to leave U.S. bank reserves unchanged when the U.S. government securities are purchased in the market.

Using the swap network. Occasionally, foreign central banks acquire dollar deposits by activating the "swap" network, which consists of reciprocal short-term credit arrangements between the Federal Reserve and certain foreign central banks. When a foreign central bank draws on its swap line at the Federal Reserve, it immediately obtains a dollar deposit at the Fed in exchange for foreign currencies, and agrees to reverse the exchange sometime in the future. On the Federal Reserve's balance sheet, activation of the swap network is reflected as an increase in Federal Reserve Bank assets denominated in foreign currencies and an increase in the liability category "foreign deposits." When the swap line is repaid, both of these accounts decline. Reserves of U.S. banks will rise when the foreign central bank spends its dollar proceeds from the swap drawing. *See illustration 41.* In contrast, reserves of U.S. banks will fall as the foreign central bank rebuilds its deposits at the Federal Reserve in order to repay a swap drawing.

The accounting entries and impact on U.S. bank reserves are the same if the Federal Reserve uses the swap network to borrow and repay foreign currencies. However, the Federal Reserve has not activated the swap network in recent years.

[22] Technically, warehousing consists of two parts: the Federal Reserve's agreement to purchase foreign currency assets from the Treasury or ESF for dollar deposits now, and the Treasury's agreement to repurchase the foreign currencies sometime in the future.

38 When a Foreign Central Bank makes a dollar-denominated payment from its account at the Federal Reserve, the recipient deposits the funds in a U.S. bank. As the payment order clears, U.S. bank reserves rise.

FEDERAL RESERVE BANK

Assets		Liabilities	
		Reserves: U.S. bank	+ 100
		Foreign deposits	- 100

U.S. BANK

Assets		Liabilities	
Reserves with F.R. Banks	+ 100	Deposits	+ 100

FOREIGN CENTRAL BANK

Assets		Liabilities	
Deposits at F.R. Banks	- 100	Accounts payable	- 100

39 If a decline in its deposits at the Federal Reserve lowers the balance below desired levels, the Foreign Central Bank will request that the Federal Reserve sell U.S. government securities for it. If the sell order is executed in the market, reserves of U.S. banks will fall by the same amount as reserves were increased in (38).

FEDERAL RESERVE BANK

Assets		Liabilities	
		Reserves: U.S. bank	- 100
		Foreign deposits	+ 100

U.S. BANK

Assets		Liabilities	
Reserves with F.R. Banks	- 100	Deposits of securities buyer	- 100

FOREIGN CENTRAL BANK

Assets		Liabilities	
Deposits at F.R. Banks	+ 100		
U.S. govt. securities	- 100		

40 If the sell order is executed with the Federal Reserve's account, however, the increase in reserves from (38) will remain in place. The Federal Reserve might choose to execute the foreign customer's sell order with the System's account if an increase in reserves is desired for domestic policy reasons.

FEDERAL RESERVE BANK

Assets		Liabilities	
U.S. govt. securities	+ 100	Foreign deposits	+ 100

U.S. BANK

Assets	Liabilities
NO CHANGE	

FOREIGN CENTRAL BANK

Assets		Liabilities	
Deposits at F.R. Banks	+ 100		
U.S. govt. securities	- 100		

41 When a Foreign Central Bank draws on a "swap" line, it receives a credit to its dollar deposits at the Federal Reserve in exchange for a foreign currency deposit credited to the Federal Reserve's account. Reserves of U.S. banks are not affected by the swap drawing transaction, but will increase as the Foreign Central Bank uses the funds as in (38).

FEDERAL RESERVE BANK

Assets		Liabilities	
Deposits at Foreign Central Bank	+ 100	Foreign deposits	+ 100

U.S. BANK

Assets	Liabilities
NO CHANGE	

FOREIGN CENTRAL BANK

Assets		Liabilities	
Deposits at F.R. Banks	+ 100	Deposits of F.R. Banks	+ 100

Federal Reserve Actions Affecting Its Holdings of U.S. Government Securities

In discussing various factors that affect reserves, it was often indicated that the Federal Reserve offsets undesired changes in reserves through open market operations, that is, by buying and selling U.S. government securities in the market. However, outright purchases and sales of securities by the Federal Reserve in the market occur infrequently, and typically are conducted when an increase or decrease in another factor is expected to persist for some time. Most market actions taken to implement changes in monetary policy or to offset changes in other factors are accomplished through the use of transactions that change reserves temporarily. In addition, there are off-market transactions the Federal Reserve sometimes uses to change its holdings of U.S. government securities and affect reserves. (Recall the example in illustrations 38 and 40.) The impact on reserves of various Federal Reserve transactions in U.S. government and federal agency securities is explained below. *(See table for a summary.)*

Outright transactions. Ownership of securities is transferred permanently to the buyer in an outright transaction, and the funds used in the transaction are transferred permanently to the seller. As a result, an outright purchase of securities by the Federal Reserve from a dealer in the market adds reserves permanently while an outright sale of securities to a dealer drains reserves permanently. The Federal Reserve can achieve the same net effect on reserves through off-market transactions where it executes outright sell and purchase orders from customers internally with the System account. In contrast, there is no impact on reserves if the Federal Reserve fills customers' outright sell and purchase orders in the market.

Temporary transactions. Repurchase agreements (RPs), and associated matched sale-purchase agreements (MSPs), transfer ownership of securities and use of funds temporarily. In an RP transaction, one party sells securities to another and agrees to buy them back on a specified future date. In an MSP transaction, one party buys securities from another and agrees to sell them back on a specified future date. In essence, then, an RP for one party in the transaction works like an MSP for the other party.

When the Federal Reserve executes what is referred to as a "System RP," it acquires securities in the market from dealers who agree to buy them back on a specified future date 1 to 15 days later. Both the System's portfolio of securities and bank reserves are increased during the term of the RP, but decline again when the dealers repurchase the securities. Thus System RPs increase reserves only temporarily. Reserves are drained temporarily when the Fed executes what is known as a "System MSP." A System MSP works like a System RP, only in the opposite direction. In a System MSP, the Fed sells securities to dealers in the market and agrees to buy them back on a specified day. The System's holdings of securities and bank reserves are reduced during the term of the MSP, but both increase when the Federal Reserve buys back the securities.

Impact on reserves of Federal Reserve transactions in U.S. government and federal agency securities

Federal Reserve Transaction	Reserve Impact
Outright Purchases of Securities	
- From dealer in market	Permanent increase
- To fill customer sell orders internally	Permanent increase
(If customer sell orders filled in market)	(No impact)
Outright Sales of Securities	
- To dealer in market	Permanent decrease
- To fill customer buy orders internally	Permanent decrease
(If customer buy orders filled in market)	(No impact)
Repurchase Agreements (RPs)	
- With dealer in market in a System RP	Temporary increase
Matched Sale-Purchase Agreements (MSPs)	
- With dealer in market in a System MSP	Temporary decrease
- To fill customer RP orders internally	No impact*
(If customer RP orders passed to market as customer-related RPs)	(Temporary increase*)
Redemption of Maturing Securities	
- Replace total amount maturing	No impact
- Redeem part of amount maturing	Permanent decrease
- Buy more than amount maturing**	Permanent increase**

* Impact based on assumption that the amount of RP orders done internally is the same as on the prior day.

**The Federal Reserve currently is prohibited by law from buying securities directly from the Treasury, except to replace maturing issues.

The Federal Reserve also uses MSPs to fill foreign customers' RP orders internally with the System account. Considered in isolation, a Federal Reserve MSP transaction with customers would drain reserves temporarily. However, these transactions occur every day, with the total amount of RP orders being fairly stable from day to day. Thus, on any given day, the Fed both buys back securities from customers to fulfill the prior day's MSP, and sells them about the same amount of securities to satisfy that day's agreement. As a result, there generally is little or no impact on reserves when the Fed uses MSPs to fill customer RP orders internally with the System account. Sometimes, however, the Federal Reserve fills some of the RP orders internally and the rest in the market. The part that is passed on to the market is known as a "customer-related RP." The Fed ends up repurchasing more securities from customers to complete the prior day's MSP than it sells to them in that day's MSP. As a result, customer-related RPs add reserves temporarily.

Maturing securities. As securities held by the Federal Reserve mature, they are exchanged for new securities. Usually the total amount maturing is replaced so that there is no impact on reserves since the Fed's total holdings remain the same. Occasionally, however, the Federal Reserve will exchange only part of the amount maturing. Treasury deposits decline as payment for the redeemed securities is made, and reserves fall as the Treasury replenishes its deposits at the Fed through TT&L calls. The reserve drain is permanent. If the Fed were to buy more than the amount of securities maturing directly from the Treasury, then reserves would increase permanently. However, the Federal Reserve currently is prohibited by law from buying securities directly from the Treasury, except to replace maturing issues.

Miscellaneous Factors Affecting Bank Reserves

The factors described below normally have negligible effects on bank reserves because changes in them either occur very slowly or tend to be balanced by concurrent changes in other factors. But at times they may require offsetting action.

Treasury Currency Outstanding

Treasury currency outstanding consists of coins, silver certificates and U.S. notes originally issued by the Treasury, and other currency originally issued by commercial banks and by Federal Reserve Banks before July 1929 but for which the Treasury has redemption responsibility. Short-run changes are small, and their effects on bank reserves are indirect.

The amount of Treasury currency outstanding currently increases only through issuance of new coin. The Treasury ships new coin to the Federal Reserve Banks for credit to Treasury deposits there. These deposits will be drawn down again, however, as the Treasury makes expenditures. Checks issued against these deposits are paid out to the public. As individuals deposit these checks in banks, reserves increase. (See explanation on pages 18 and 19.)

When any type of Treasury currency is retired, bank reserves decline. As banks turn in Treasury currency for redemption, they receive Federal Reserve notes or coin in exchange or a credit to their reserve accounts, leaving their total reserves (reserve balances and vault cash) initially unchanged. However, the Treasury's deposits in the Reserve Banks are charged when Treasury currency is retired. Transfers from TT&L balances in banks to the Reserve Banks replenish these deposits. Such transfers absorb reserves.

Treasury Cash Holdings

In addition to accounts in depository institutions and Federal Reserve Banks, the Treasury holds some currency in its own vaults. Changes in these holdings affect bank reserves just like changes in the Treasury's deposit account at the Reserve Banks. When Treasury holdings of currency increase, they do so at the expense of deposits in banks. As cash holdings of the Treasury decline, on the other hand, these funds move into bank deposits and increase bank reserves.

Other Deposits in Reserve Banks

Besides U.S. banks, the U.S. Treasury, and foreign central banks and governments, there are some international organizations and certain U.S. government agencies that keep funds on deposit in the Federal Reserve Banks. In general, balances are built up through transfers of deposits held at U.S. banks. Such transfers may take place either directly, where these customers also have deposits in U.S. banks, or indirectly by the deposit of funds acquired from others who do have accounts at U.S. banks. Such transfers into "other deposits" drain reserves.

When these customers draw on their Federal Reserve balances (say, to purchase securities), these funds are paid to the public and deposited in U.S. banks, thus increasing bank reserves. Just like foreign customers, these "other" customers manage their balances at the Federal Reserve closely so that changes in their deposits tend to be small and have minimal net impact on reserves.

Nonfloat-Related Adjustments

Certain adjustments are incorporated into published data on reserve balances to reflect nonfloat-related corrections. Such a correction might be made, for example, if an individual bank had mistakenly reported fewer reservable deposits than actually existed and had held smaller reserve balances than necessary in some past period. To correct for this error, a nonfloat-related as-of adjustment will be applied to the bank's reserve position. This essentially results in the bank having to hold higher balances in its reserve account in the current and/or future periods than would be needed to satisfy reserve requirements in those periods. Nonfloat-related as-of adjustments affect the allocation of funds in bank reserve accounts but not the total amount in these accounts as reflected on Federal Reserve Bank and individual bank balance sheets. Published data on reserve balances, however, are adjusted to show only those reserve balances held to meet the current and/or future period reserve requirements.

Other Federal Reserve Accounts

Earlier sections of this booklet described the way in which bank reserves increase when the Federal Reserve purchases securities and decline when the Fed sells securities. The same results follow from any Federal Reserve expenditure or receipt. Every payment made by the Reserve Banks, in meeting expenses or acquiring any assets, affects deposits and bank reserves in the same way as does the payment to a dealer for government securities. Similarly, Reserve Bank receipts of interest on loans and securities and increases in paid-in capital absorb reserves.

The Reserve Multiplier —Why It Varies

The deposit expansion and contraction associated with a given change in bank reserves, as illustrated earlier in this booklet, assumed a fixed reserve-to-deposit multiplier. That multiplier was determined by a uniform percentage reserve requirement specified for transaction accounts. Such an assumption is an oversimplification of the actual relationship between changes in reserves and changes in money, especially in the short run. For a number of reasons, as discussed in this section, the quantity of reserves associated with a given quantity of transaction deposits is constantly changing.

One slippage affecting the reserve multiplier is variation in the amount of excess reserves. In the real world, reserves are not always fully utilized. There are always some excess reserves in the banking system, reflecting frictions and lags as funds flow among thousands of individual banks.

Excess reserves present a problem for monetary policy implementation only because the amount changes. To the extent that new reserves supplied are offset by rising excess reserves, actual money growth falls short of the theoretical maximum. Conversely, a reduction in excess reserves by the banking system has the same effect on monetary expansion as the injection of an equal amount of new reserves.

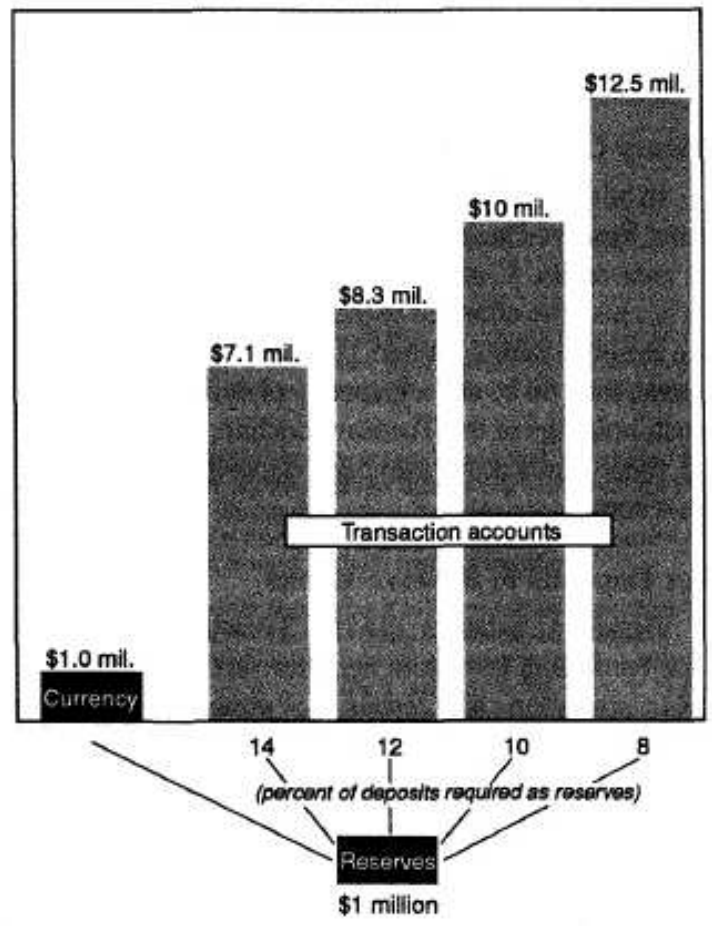
Slippages also arise from reserve requirements being imposed on liabilities not included in money as well as differing reserve ratios being applied to transaction deposits according to the size of the bank. From 1980 through 1990, reserve requirements were imposed on certain nontransaction liabilities of all depository institutions, and before then on all deposits of member banks. The reserve multiplier was affected by flows of funds between institutions subject to differing reserve requirements as well as by shifts of funds between transaction deposits and other liabilities subject to reserve requirements. The extension of reserve requirements to all depository institutions in 1980 and the elimination of reserve requirements against nonpersonal time deposits and Eurocurrency liabilities in late 1990 reduced, but did not eliminate, this source of instability in the reserve multiplier. The deposit expansion potential of a given volume of reserves still is affected by shifts of transaction deposits between larger institutions and those either exempt from reserve requirements or whose transaction deposits are within the tranche subject to a 3 percent reserve requirement.

In addition, the reserve multiplier is affected by conversions of deposits into currency or vice versa. This factor was important in the 1980s as the public's desired currency holdings relative to transaction deposits in money shifted considerably. Also affecting the multiplier are shifts between transaction deposits included in money and other transaction accounts that also are reservable but not included in money, such as demand deposits due to depository institutions, the U.S government, and foreign banks and official institutions. In the aggregate, these non-money transaction deposits are relatively small in comparison to total transaction accounts, but can vary significantly from week to week.

A net injection of reserves has widely different effects depending on how it is absorbed. Only a dollar-for-dollar increase in the money supply would result if the new reserves were paid out in currency to the public. With a uniform 10 percent reserve requirement, a $1 increase in reserves would support $10 of additional transaction accounts. An even larger amount would be supported under the graduated system where smaller institutions are subject to reserve requirements below 10 percent. But, $1 of new reserves also would support an additional $10 of certain reservable transaction accounts that are not counted as money. *(See chart below.)* Normally, an increase in reserves would be absorbed by some combination of these currency and transaction deposit changes.

All of these factors are to some extent predictable and are taken into account in decisions as to the amount of reserves that need to be supplied to achieve the desired rate of monetary expansion. They help explain why short-run fluctuations in bank reserves often are disproportionate to, and sometimes in the opposite direction from, changes in the deposit component of money.

The growth potential of a $1 million reserve injection



Money Creation and Reserve Management

Another reason for short-run variation in the amount of reserves supplied is that credit expansion — and thus deposit creation — is variable, reflecting uneven timing of credit demands. Although bank loan policies normally take account of the general availability of funds, the size and timing of loans and investments made under those policies depend largely on customers' credit needs.

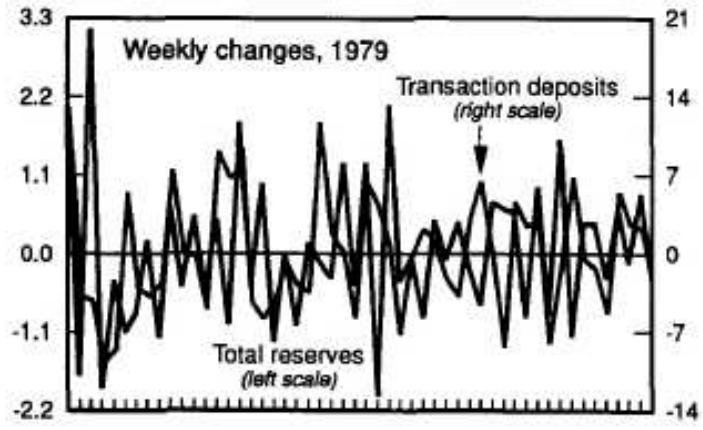
In the real world, a bank's lending is not normally constrained by the amount of excess reserves it has at any given moment. Rather, loans are made, or not made, depending on the bank's credit policies and its expectations about its ability to obtain the funds necessary to pay its customers' checks and maintain required reserves in a timely fashion. In fact, because Federal Reserve regulations in effect from 1968 through early 1984 specified that average required reserves for a given week should be based on average deposit levels two weeks earlier ("lagged" reserve accounting), deposit creation actually preceded the provision of supporting reserves. In early 1984, a more "contemporaneous" reserve accounting system was implemented in order to improve monetary control.

In February 1984, banks shifted to maintaining average reserves over a two-week reserve maintenance period ending Wednesday against average transaction deposits held over the two-week computation period ending only two days earlier. Under this rule, actual transaction deposit expansion was expected to more closely approximate the process explained at the beginning of this booklet. However, some slippages still exist because of short-run uncertainties about the level of both reserves and transaction deposits near the close of reserve maintenance periods. Moreover, not all banks must maintain reserves according to the contemporaneous accounting system. Smaller institutions are either exempt completely or only have to maintain reserves quarterly against average deposits in one week of the prior quarterly period.

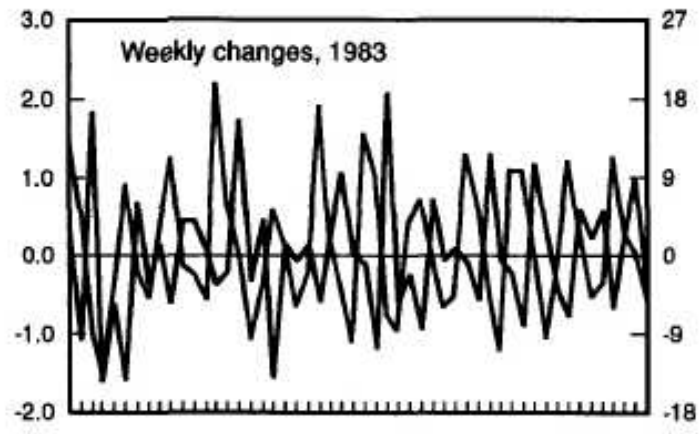
On balance, however, variability in the reserve multiplier has been reduced by the extension of reserve requirements to all institutions in 1980, by the adoption of contemporaneous reserve accounting in 1984, and by the removal of reserve requirements against nontransaction deposits and liabilities in late 1990. As a result, short-term changes in total reserves and transaction deposits in money are more closely related now than they were before. *(See charts on this page.)* The lowering of the reserve requirement against transaction accounts above the 3 percent tranche in April 1992 also should contribute to stabilizing the multiplier, at least in theory.

Ironically, these modifications contributing to a less variable relationship between changes in reserves and changes in transaction deposits occurred as the relationship between transactions money (M1) and the economy deteriorated. Because the M1 measure of money has become less useful as a guide for policy, somewhat greater attention has shifted to the broader measures M2 and M3. However, reserve multiplier relationships for the broader monetary measures are far more variable than that for M1.

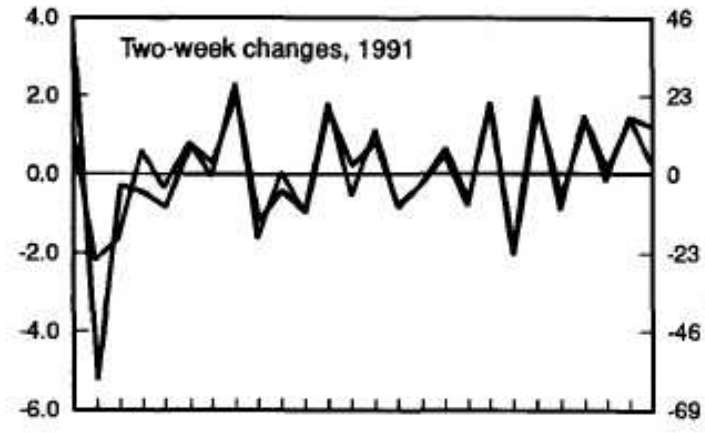
The relationship between short-term changes in reserves and transaction deposits was quite volatile before the Monetary Control Act of 1980 . . .



. . . and before adoption of contemporaneous reserve accounting in 1984 . . .



. . . but less variable afterward.



Note: All data are in billions of dollars, not seasonally adusted. Scaling approximately reflects each year's average ratio of transaction deposits to total reserves.

Although every bank must operate within the system where the total amount of reserves is controlled by the Federal Reserve, its response to policy action is indirect. The individual bank does not know today precisely what its reserve position will be at the time the proceeds of today's loans are paid out. Nor does it know when new reserves are being supplied to the banking system. Reserves are distributed among thousands of banks, and the individual banker cannot distinguish between inflows originating from additions to reserves through Federal Reserve action and shifts of funds from other banks that occur in the normal course of business.

To equate short-run reserve needs with available funds, therefore, many banks turn to the money market — borrowing funds to cover deficits or lending temporary surpluses. When the demand for reserves is strong relative to the supply, funds obtained from money market sources to cover deficits tend to become more expensive and harder to obtain, which, in turn, may induce banks to adopt more restrictive loan policies and thus slow the rate of deposit growth.

Federal Reserve open market operations exert control over the creation of deposits mainly through their impact on the availability and cost of funds in the money market. When the total amount of reserves supplied to the banking system through open market operations falls short of the amount required, some banks are forced to borrow at the Federal Reserve discount window. Because such borrowing is restricted to short periods, the need to repay it tends to induce restraint on further deposit expansion by the borrowing bank. Conversely, when there are excess reserves in the banking system, individual banks find it easy and relatively inexpensive to acquire reserves, and expansion in loans, investments, and deposits is encouraged.

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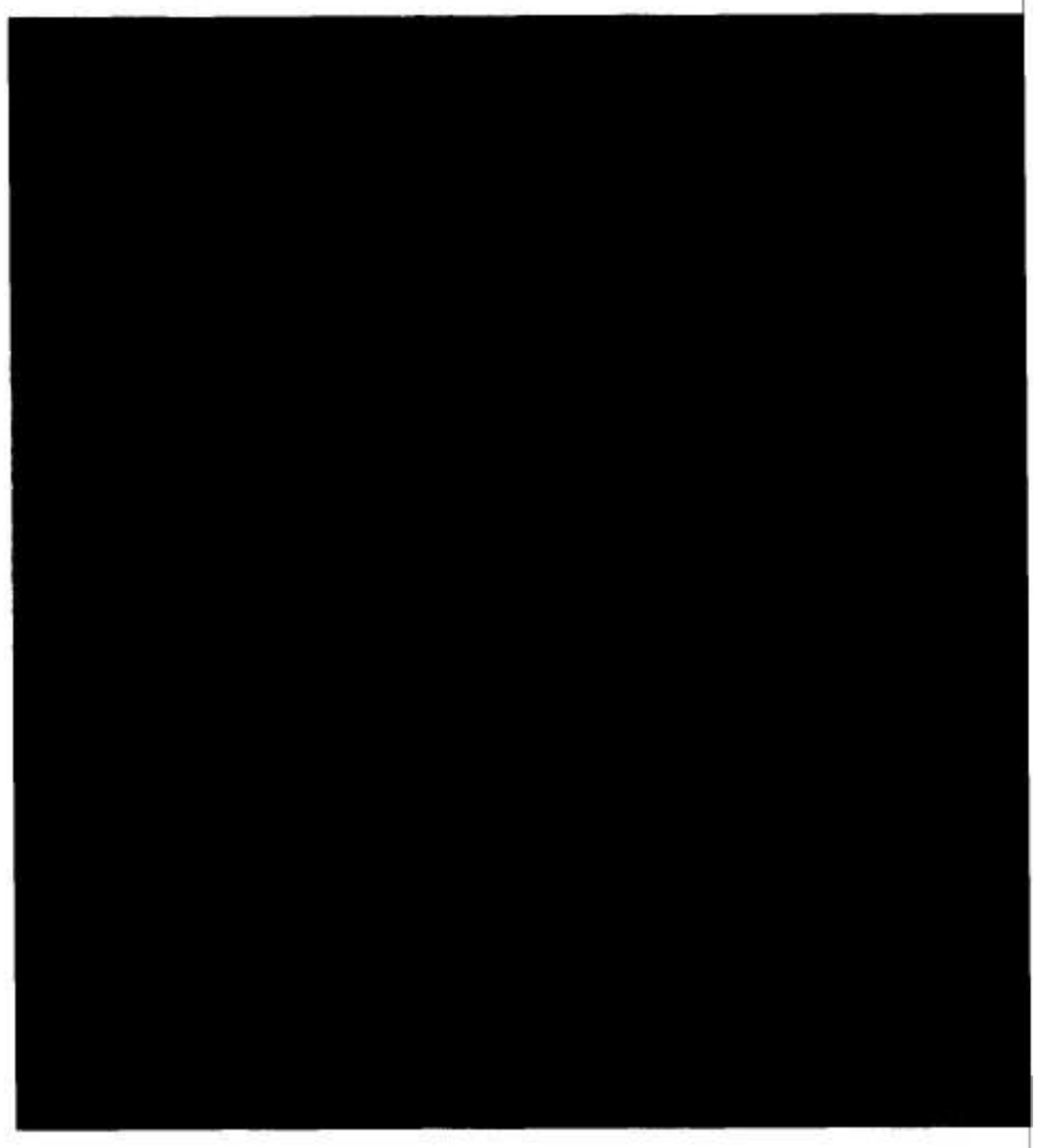

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